AMERICAN GAS JOURNAL

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FEBRUARY 1943

EMCO PRESSED STEEL METERS

THE BEST METER IN THE END BECAUSE IT'S MORE METER TO BEGIN WITH!

Accurate measurement by EMCO Pressed Steel Meters, positive line control with Nordstrom Valves on this large volume industrial meter setting

FROM the hundreds of gas utilities, who for years have been relying upon EMCO Pressed Steel Meters for accurate, dependable measurement, have been received many expressions concerning their reliability and satisfactory operation. We quote the following paragraphs from a recent statement made by a well known superintendent of gas distribution and regulation in New York state.

"Taking into consideration all of the variables of metering service, we have had very fine success with our EMCO No. 4½ and No. 5 Meters. Tests, following reconditioning, usually show perfect results.

"It is very interesting to note the small error in EMCO Pressed Steel Meters after passing large volumes of gas. For example, two of these meters passed 180 million cubic feet, each at 10 pounds pressure under severe turn-on and turn-off conditions. One of these meters was found to be ½% slow and another ½% fast.

"An approximate estimate of the volume passed per EMCO Pressed Steel Meter in our system would be about 2 million cubic feet per month, per meter. Our repair costs and service costs for our large capacity meters are exceedingly small in comparison to the large quantity of gas metered."

Expressions such as these prove that the EMCO Pressed Steel Meter is the best meter in the end because it's more meter to begin with.

PITTSBURGH EQUITABLE METER COMPANY

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MERCO NORDSTROM VALVE COMPANY
Main Offices, Pittsburgh, Pa.
NATIONAL METER DIVISION, Brooklyn, N. Y.

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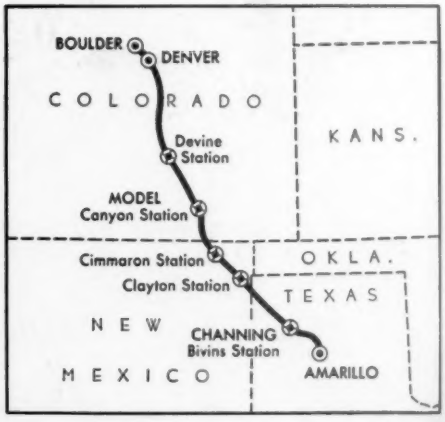
THIS 80-page manual, profusely illustrated, tells the approved methods for renewing the life of all EMCO and Ironclad Meters. Factory designed jigs and tools described therein can be secured that will simplify repair procedure and assure an accurately fitted job even with inexperienced labor.

Meter Shop Foremen, Distribution Superintendents and Measurement Engineers are invited to write for this Repair and Maintenance Manual as well as for up-to-date parts lists for all EMCO products.

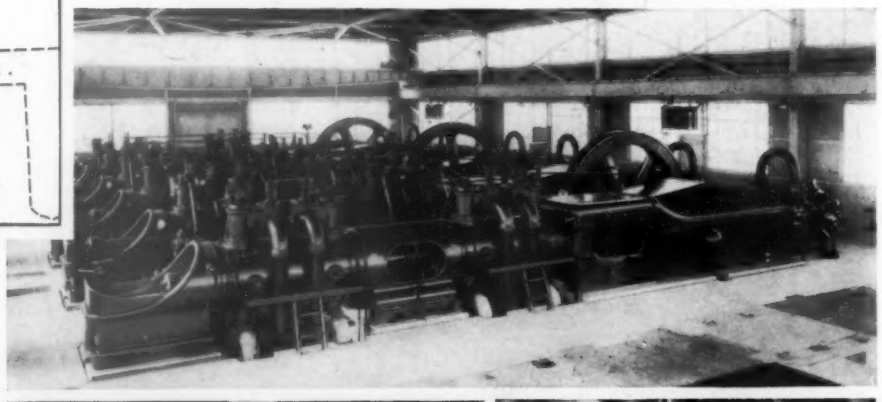
Write for this Manual

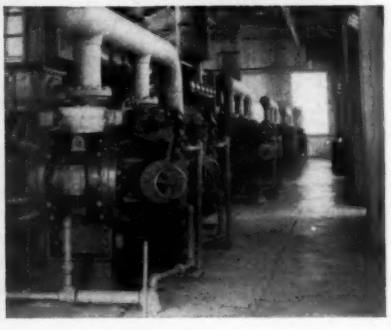
EMCO METERS END REGULATORS

FEB 19 1943



AN OUTSTANDING PERFORMANCE BROUGHT TWO ENCORES





(Above) The Colorado Interstate Gas Line—starting at Amarillo, Texas, and terminating at Denver, Colorado.

(Top right) Worthington horizontal gas-engine-compressors, typical of original equipment specified when line was built. Still operating.

(Lower left) Two 625-horsepower angle-type units, a supplementary installation to meet increased capacity requirements.

(Extreme right) Four 750-horsepower angle-type compressor units installed in the Cimmaron Station . . . latest additions to the line.

When the Colorado Interstate Gas Line was built in 1929, between the Texas fields and Denver, it was equipped entirely with Worthington horizontal gas-engine-compressors. Performance on other lines decided the choice.

Later, when the Devine Station required additional capacity, Worthington equipment was again selected . . . this time two compact angle-type units of 625 horsepower each.

The question of equipment purchase came up next when the new Cimmaron Station was added to the line and, once again, the decision was Worthington. This station comprises four 750-horsepower angle-type units.

Denver's important gas line remains predominantly Worthington solely on the basis of demonstrated ability to do the job year after year . . . another example of long-term justification of the Worthington conception of engineering and manufacturing methods.

Gas Engines totaling more than three-quarters of a million horsepower now in operation.

GC3-1

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What do you know ABOUT CARBURETED WATER GAS MACHINES?

Q. *Can a carbureted water gas machine be operated successfully and efficiently on 100% bituminous coal and 100% heavy oil?*

A. Yes, indeed, if it is a Semet-Solvay REVERSE FLOW Water Gas Machine.

Q. *Does operation on 100% bituminous and 100% heavy oil cause the machine to smoke?*

A. No, indeed, not the Semet-Solvay REVERSE FLOW Water Gas Machine.

Q. *Can a carbureted water gas machine be changed at will, and without alterations in the machine, from coke or anthracite to bituminous coal, and from one grade of oil to another grade?*

A. Yes, indeed, if it is a Semet-Solvay REVERSE FLOW Water Gas Machine. You can take advantage of every change in market prices.

Q. *Is the REVERSE FLOW process new and untried?*

A. No, indeed. The first Semet-Solvay REVERSE FLOW Water Gas Machine was installed in 1937. Today there are ten plants in successful operation and three more under construction. Names gladly furnished on request.

Q. *Can existing water gas machines be modernized to obtain REVERSE FLOW advantages?*

A. Yes, indeed. Semet-Solvay can apply the REVERSE FLOW principle to all three-shell water gas machines.

Q. *Are all Semet-Solvay Water Gas Machines REVERSE FLOW?*

A. No, indeed. Semet-Solvay can furnish all types of water gas machines.

Q. *Are all REVERSE FLOW Water Gas Machines Semet-Solvay Machines?*

A. Yes, indeed. REVERSE FLOW is an exclusive Semet-Solvay development.

Q. *Is it difficult to make sure just what economies and other advantages you can expect from the REVERSE FLOW process in YOUR plant?*

A. No, indeed. Semet-Solvay will be glad to make a survey and complete report without cost or obligation to you. Why not write them today?

SEMET-SOLVAY ENGINEERING CORPORATION

40 Rector Street New York, N. Y.

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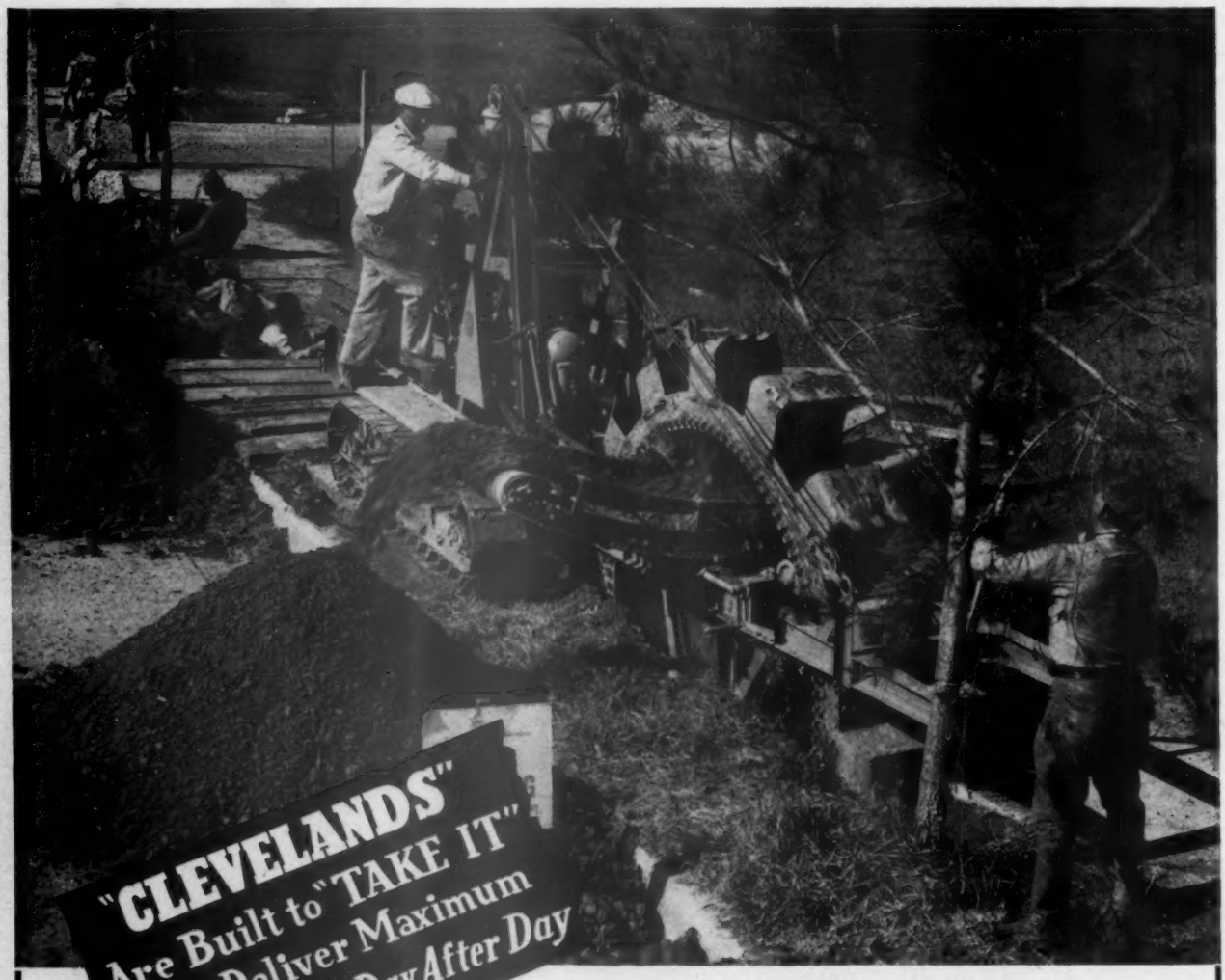

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FEBRUARY
1943

AMERICAN
GAS JOURNAL

VOLUME 158
NO. 2

Planning For Post-War Developments of Gas Ranges and Water Heaters

THE BROOKLYN UNION GAS COMPANY, Brooklyn, N. Y., has just issued what they say is "A compilation and digest on this company's suggestions for the gas industry's post-war planning campaign." The digest covers all domestic gas appliances, and makes suggestions on improvements in each. They state "It is not necessary, here, to point out the need for radical improvement of these appliances. However, it is probably impossible to stress too strongly the urgency of action by the Gas Industry, now, in not only setting up desirable goals, but also of achieving many of them prior to the post-war period for which our competitors are actively preparing.

"Our criticisms of existing gas appliances and suggestions for their improvement are based on a wide and practical experience with these appliances and competitive appliances in the hands of our customers. Our approach to these problems includes the technical, mechanical, service and sales viewpoints and embodies customer reactions to gas and gas appliances.

"Many of our suggested developments are easily possible of achievement in the near future. Others will require study and research to establish their soundness and detail. Again, others may be, at present, idealistic and therefore to be considered from a longer range viewpoint."

Gas Range Development

The present time is opportune to reconsider our entire concept of a gas range. If a purely scientific and detached approach were made to the problem of creating a perfect domestic gas fired cooking machine, it is very probable that it would not duplicate the present gas range. It would undoubtedly involve the use of new materials but recently made available. In order to accomplish these results, it might be necessary to use methods and mechanisms now foreign to our thinking; not scorning those made available through the use of electricity.

It would also be found that heat in the radiant form has outstanding advantages for some types of cooking and would make others more economical and faster because of its ability to transfer heat energy more efficiently.

Having designed a gas-fired kitchen heat machine for cooking, it would be logical to ascertain what other heat requirements there were in the home and combine as many as possible of them into our kitchen heat machine. Within limits there might well be added to it such functions as humidification, clothes drying, limited space heating, dehydration and in some cases, water heating. Having met these specifications, our kitchen heat machine, in all probability, would not look like and certainly would not be like our present gas range.

From a research and development point of view, the foregoing is not too visionary. It is a detached and almost necessary concept of the gas range of the future.

Based on shorter range planning, there are many things which can be done to improve our existing gas ranges. They are given below and are the result of suggestions from those in our Company who are engaged in all phases of appliance work. They include sales and manufacturing as well as technical and mechanical considerations.

Appliance Design Suggestions

Top Burners

1. Make top burners heat faster and thereby magnify the only real advantage that we now have over the electric range.
2. Improve top burner ignition. Present flash tube ignition is satisfactory in most respects. However there are complaints of odor from unburned gas especially where ignition is even slightly delayed for any reason.

3. Design burners so that there is no residual gas in burner after extinguishing. One type of burner has been built by The Brooklyn Union Gas Company to accomplish this result. (See B.U.G. Development Report). This problem and the above burner have been submitted to the American Gas Association which is investigating it at the laboratory.
4. Simplify burner box (under burners) to make cleaning easier.
5. Make top burners that are easier to clean.
6. Gas range cocks. There is need for improvement in the design of these cocks as well as their installation in the range. Complaints due to sticking and looseness of cocks are numerous.
7. Consider use of one or more radiant type burners. This will require development of types of burners not now available. Use of radiant heat in broiler is generally conceded to be desirable. A radiant type top burner might be advantageous for toasting, grilling, etc. It might prove to be a faster burner for all top burner work.
8. Develop finish for burners and grids that will not deteriorate from flame exposure.
9. Make low position of simmer burners maintain temperature well below boiling.
10. Design grids that will hold small utensils firmly.

Bake Ovens

1. Make linings easily removable for cleaning and repair.
2. Devise better, more dependable ignition of oven burners. Many thrifty housekeepers object to the gas consumed by a continuous pilot and the present electric igniters are far from perfect in design, workmanship, materials and installation in the range.
3. Improve heat distribution in oven without sacrificing speed. Many models do not brown food evenly over all of shelf area.

Broiling Ovens

1. Consider the use of a highly radiant type of burner.
2. Improve quality of broiling so that thin cuts of meat can be broiled equal to thicker ones. Improved radiant type burner mentioned above may go far toward accomplishing this result.
3. Some present electric igniters are so installed that they interfere with placing of meat near burner.
4. A new type of temperature control needed, that will not bank during broiling. Our Home Service Personnel report that this is a common complaint.
5. Eliminate or minimize smoke from broiling operation.
6. Make oven flue outlets easily removable for cleaning.
7. Consider desirability of ovens placed higher than present types.

General

1. Use new materials of construction, plastics, aluminum, magnesium, glass, etc.—especially use more serviceable material for working top, such as heat-proof and stain-proof plastic.
2. If use of steel is continued, use less fragile and more durable finishes.
3. Recess base of range to allow for toe room.
4. Provide a utility gas outlet on range for connecting other burners and appliances.
5. Build moderate priced range with a higher broiler.

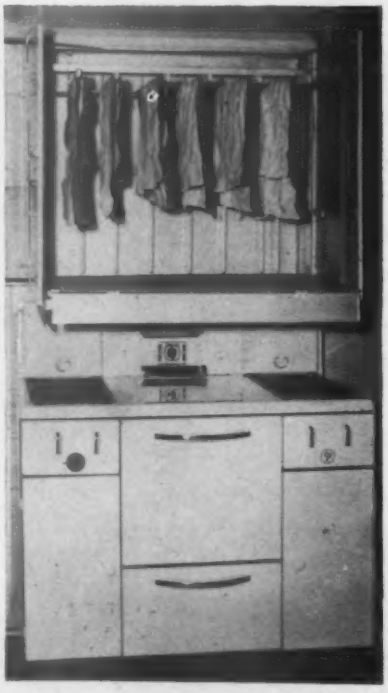


Illustration shows how clothes dryer can employ heat rising from a range

6. Reduce the number of models and makes. Concentrate on four models.
   a. A good low-priced range, without gadgets and expensive hardware.
   b. A medium price range.
   c. A C.P. range.
   d. A super range.
7. Consider adoption of Sebold orifice.
8. Develop systems for kitchen ventilation or flue gas removal. This is probably not the direct responsibility of the range manufacturer. It does, however, relate to the satisfactory use of gas ranges generally. The removal of odors, heat, moisture and products of combustion is a very real kitchen problem.
9. Eliminate grease and dust catchers—trimmings, joints, etc. Precision fit of all parts would help.
10. Reduce outside temperature of range by structural changes and better insulation.
11. Standardize all bolts, screws, nuts and other means of fastening in order to simplify maintenance and lessen the number and variety of tools needed by maintenance men.

Additional Range Functions

1. *Humidification* — Moisture moves through air rapidly. It will spread quickly from one room to another. A water evaporating device, manual or automatic, placed on or built into the range will add greatly to the comfort and healthfulness of most American homes. The public is becoming humidity conscious and desires some such simple device.
2. *Incidental Clothes Drying*—A survey made by Good Housekeeping Institute showed that, beside the weekly wash, in the average city home, there is one or more articles washed and dried every day of the week. This work is done in the kitchen or bathroom. It is a perfect function for gas and the demand already exists. One type, applicable to almost any gas range, has already been built by The Brooklyn Union Gas Company.
3. Devise method of using heat in products of combustion for warming closet. The new clothes drier can perform this function to a great extent.

4. *Toasting*—This is not a new idea, but it still remains to be put into practice satisfactorily. Good toasting equipment for top burners and for broiler oven must be developed.

Water Heaters

In the development of water heaters for the post-war era, consideration should be given to the following:

1. Reduction in First Cost to the customer.
2. Reduction in operating costs.
3. Development of accessories to convert existing gas water heating units.
4. Commercial volume water heating.

Reduced in First Cost to the Customer

Production, selling and installation costs will influence this factor. The last two costs will depend on local conditions principally, and are not discussed in this report.

Production costs can be governed by the manufacturer, and lowering of them is of prime importance if the gas industry is to make greater headway in this field than they have made in the pre-war era.

A long step in this direction could be achieved by standardization of tanks, thermostats, burners, relief valves, etc. A great many objections will be raised to this. However, the Electric Industry is giving this serious consideration.

By standardization of tanks is meant that all thirty gallon copper tanks will have the same diameter, height, tapping dimensions and locations. Similar treatment would be accorded to 40, 60 gallon tanks, etc., and to glass-lined tanks, monel and galvanized. We state this in detail to avoid a misunderstanding of standardization. We do not mean one tank of a particular size and particular material. Thermostats, burners, etc. could be similarly treated, that is tapping and pipe connections could be standard, whereas other features incorporating individual ingenuity of manufacturers might still be retained. Standardization would benefit not only the consumer, but also the manufacturer, dealer and utility.

The manufacturer through standardization will benefit in lower costs in all production phases—purchase of materials, design and engineering, increased volume, fewer changeovers, fewer tools, lower stock, etc.

The distributor and dealer—better delivery, lower inventories, fewer repair parts, greater turnover.

The consumer—assurance of quality merchandise, low appliance cost, cheaper and speedier upkeep.

The utility—greater sales, prompt and cheaper service, better customer relations, larger all-year water heating loads.

Water heaters of the future should be simple, rugged and efficient. Appearance is not a major factor. Water heaters are not "on parade" as are refrigerators and ranges. Therefore, water heaters are purely utilitarian. They are out of sight and out of mind *until* the moment a faucet is opened—then plenty of hot water at low cost is desired. Consequently, all manufacturing efforts should be directed toward performance and low operating cost. We do not suggest that appearance receive no attention whatsoever, but merely point out that it should not be emphasized at the cost of other factors. In some instances in the past this was done.

A careful study of new materials should be made for use in water heaters. Recent developments as glass-lined tanks and plastic linings may prove to be important advances in reduction of first costs.

Another suggestion is to investigate the use of mixing valves, permitting storage of higher temperature water, thereby giving larger standby capacity with smaller heaters.

Provision for convenient and safe customer lighting and shutting off of heaters should be made. Shutting off is easy, *but* have you ever tried lighting some of our water heaters? Safe, yes—as far as gas explosion is concerned, but darn hard on your knees, back, neck and general equilibrium and dignity. Some are virtually impossible to light except by means of long tapers. Customer lighting of water heaters and house heating units has long been the stepchild of the industry. It is about time we did something and now is the time.

Water pipe outlets should be taken off rear of heater instead of top.

Reduction in Operating Costs

Manufacturers have made considerable advances in efficiency of water heating units. It is doubtful whether any further advances would be practical since this would introduce problems of condensation and flueing which would cost more than that saved by increased unit efficiency. Overall installation efficiency is another story since costly operating expenses may result if long piping runs are made of larger than necessary piping, even if the water heater unit is tops in efficiency, but that is the problem of the dealer, utility and general installer, not of the manufacturer.

However, there are certain items which the manufacturer should consider which would reduce operating costs.

The storage water heater should have customer control; i. e. either control of high and low inputs or temperature or both. Water heater variable input burners now supplied by one manufacturer should be adopted more generally.

Insulation should be studied from the standpoint of life efficiency, that is tendency to breakdown, thus reducing effectiveness.

Flueways should incorporate a heat trap which will stop draft through the water heater during "off" periods. A heat trap also should be incorporated in the hot water outlet line. These will reduce operating costs. Both should be built in the water heater.

The design of equipment should be such as to minimize liming in hard water districts.

Development of Conversion Accessories

Manually operated side arm heaters have constituted a considerable portion of our domestic gas water heating load. Recently we have lost far too great a number to competitive fuels. Many of these could have been saved had low cost, cheaply installed conversion accessories been available. It is true such items exist, but not in complete package form, that is, burners, controls, relief valves, insulation, diverters, etc. Separately, they could be purchased, and when assembled often required extra installation labor because of slight variances. If one package were made, much of the difficulties and consequent costs could be reduced.

Low cost conversion of manual water heaters is a necessary complement to complete storage units. Many people who desire automatic service, and cannot purchase a new storage unit, will thus be served and saved to gas fuel. If this is not done, we will continue to lose them to other fuels, particularly coal pots and to automatic coal and oil equipment. Having lost them once, it will be

(*Concluded on page 32*)

Gasoline For Carburetting Water Gas

By
R. J. Horn
Central Hudson Gas & Electric Corporation
Poughkeepsie, New York

Findings are reported covering the use of gasoline for carburetting water gas in an isolated 7'6" set operated both reforming and nonreforming over a period of several days with coke as generator fuel. A comparison of results is made with conventional gas making oil, using the same equipment. Description of plant equipment, tabulation of technical data for the materials used and produced, and consideration of the economic factors involved are given.

THE OFFICE of the Petroleum Coordinator for War has suggested that unleaded gasoline or other motor fuel distillates may be available to gas companies for carburetting water gas possibly within the next few months, as a result of change of practices in refinery operations.

A plant test has been made by this Company using gasoline as a carburetting medium. The test gasoline used was recommended by the New York Office of the Petroleum Coordinator for War and was furnished from Titusville, Pennsylvania, by the Cities Service Company.

With the approval of the Office of Petroleum Coordinator and the Local Rationing Board in Kingston, N. Y., the gasoline necessary for test purposes, was purchased.

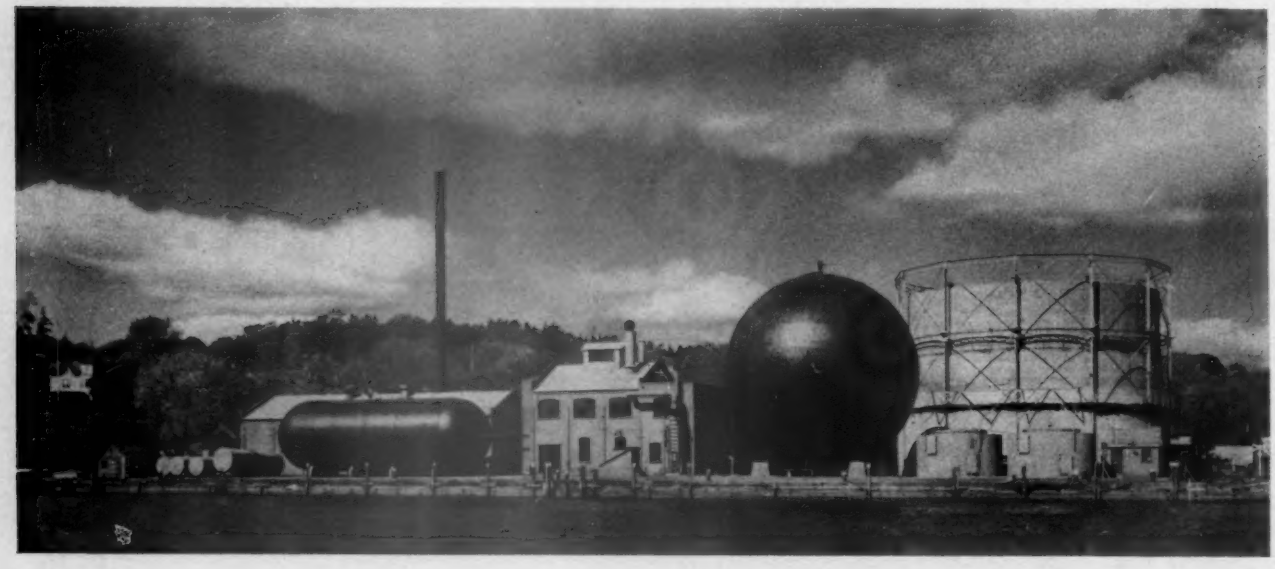
Results obtained indicate that the permissible price payable for this carburetting material would possibly be about 3 or 4 mills per gallon above the price paid for gas oil to give the same net total cost for gas making materials as with gas oil. During a continuous operating period of five consecutive days and three other operating periods of a few hours each on different days, no difficulties developed which would indicate the gasoline tested as being unsuitable for gas making. No effort was made to study the problem of handling and storing gasoline in gas works oil tanks in quantities necessary for full scale operations.

In order to determine the economic and physical aspects of water gas carburetion with gasoline, 30,544 gallons of the gasoline were used at the Kingston Gas Works under regular operating conditions during several test periods in the months of October and November, 1942. This material had an octane rating of 65 maximum, and a Reid vapor pressure of 6.8 pounds. Table No. 1 shows the distillation characteristics of the gasoline.

The gasoline received in railroad tank cars was unloaded with a motor-driven centrifugal pump driven by a 7½ horsepower explosion proof motor. The car, the railroad rails, the piping system, the pump and the 10,000 gallon horizontal storage tanks were grounded by a common conductor to the City water main, as a precaution against electrical potential between any of these objects, causing ignition of gasoline vapors which might be escaping. Figure No. 1 illustrates the grounding method used. The tanks were equipped with screened vents. No study was made of the actual losses of gasoline due to vaporization. A bulletin described as Manual Sheet TC-4 by the Manufacturing Chemists' Association, Washington, D. C., gives full details about unloading cars containing flammable liquids.

A water gas set with 7' 6" generator, 7' 0" carburetor and 7' 0" superheater, with full backrun equipment was used at the Kingston Gas Works for this test. No other sets were operated at this plant and no gas was made from any other carburetting material during the test period. The two short test periods used on dif-

Kingston Gas Works



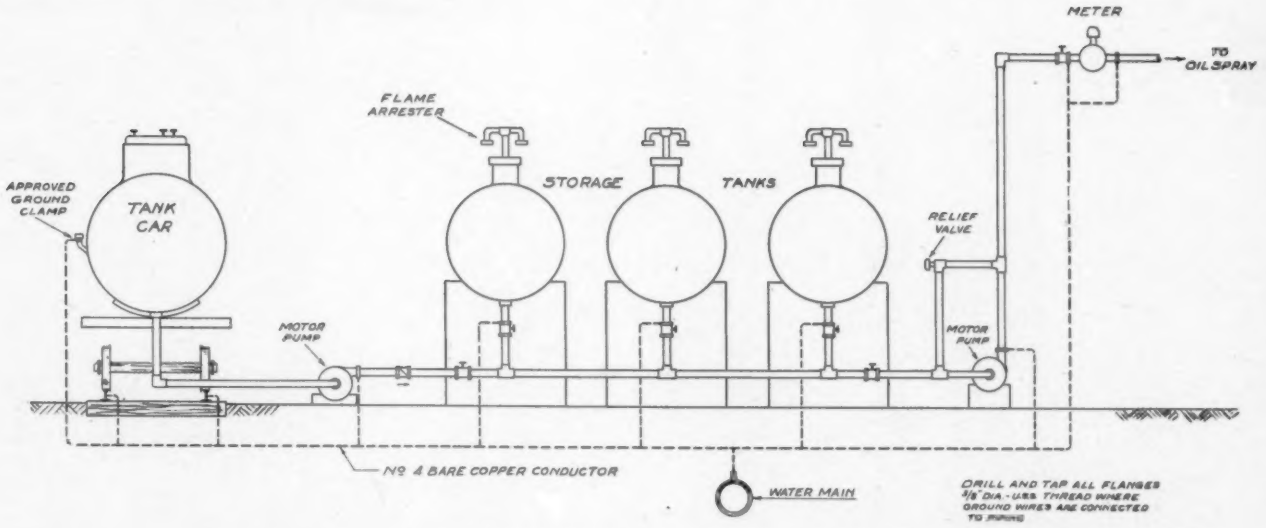


Figure 1—Grounding arrangement for unloading, storing, pumping and piping gasoline

ferent days late in October were run in order to determine the proper pressures and correct size for oil spray drilling, and also in order to test out the piping and pumping equipment.

TABLE 1

Distillation of Gasoline Used in Test	
I. B. P. 104°F.	60% Dist. at 238°F.
10% Dist. at 162°F.	70% Dist. at 250°F.
20% Dist. at 184°F.	80% Dist. at 266°F.
30% Dist. at 202°F.	90% Dist. at 296°F.
40% Dist. at 216°F.	E.P. Dist. at 356°F.
50% Dist. at 226°F.	

The generator used is lined with a thin wall faced with silicon carbide, giving an inside diameter of 6′ 3½″ with an area of 31.09 square feet; and the carburetor is flued with 2½″ spacings for a height of 7′ 6″ up to the bottom of the crossover connection from the generator. The superheater is checkered with 2½″ spacings for a height of 9′ 6″. An Anthony type oil spray with five 11/16″ openings is installed in the carburetor and the same type of spray with one 11/16″ opening is installed in the generator. No changes were made in these sprays during the tests reported herein.

All the gas made was cooled to 48°F. at the inlet of the exhauster, purified with iron oxide, metered and stored in a water sealed holder prior to compression. The generator fuel was by-product coke charged into the generator from buggies by hand. The relief holder is connected so that it floats on the line between the wash box off-take and the primary cooler located just ahead of the exhauster. Tar was gathered from all the drips and the primary cooler and all other sources except the relief holder. Light oil was collected in the condensate from the aftercoolers following the compressor and from the high pressure storage holder. Analyses were made of the gas before and after compression and the heating value was determined at each of these two places.

All the gas was compressed to 40# gauge and cooled at that pressure to 85°F.

For purposes of examining the results, the test run with gasoline may be divided into three operating periods as follows: (1) Short preliminary runs (on two different days) for the purpose of adjusting and testing out facilities for introducing gasoline into the set and a final run for a few hours on the last day when little sampling was done and few analyses were made; (2) three days running nonreforming; and (3) two days running reforming. Table No. 2 summarizes the results for nonreforming and for reforming; and also for all gasoline runs combined, in which shrinkage and evaporation losses as well as poor results from trial adjustments and all other factors are included.

In order to establish a comparison with the oil ordinarily used at this plant, a second test run was made on the same set as used for the gasoline, six days after completion of the test run on gasoline. No gas was made in the plant during the six intervening days. On this test run of one day duration, the oil consisted of 67.4% gas oil of about 32 API, gravity and 32.6% Lima crude from wells in Ohio. The same conditions of operation prevailed during this test run as during the test run with gasoline, except that no reforming was done.

During two of the five days of the test run with gasoline, reforming was practised to the extent of 20% of the total gasoline used each run. On the remaining three days, a straight operating cycle was used, similar to that common with gas oil, and in which 19% of the total gasoline was injected into the generator on the uprun rather than on the backrun as when reforming. A deposit of lampblack or finely divided carbon in the ash while running reforming was noticeable but did not bother the fire cleaners. This deposit was small and

TABLE 2—Summary of Results with Gasoline in 7′ 6″ Set

	Non-reforming	*Reforming*	*All Test Runs Combined*
Total Gas Made, MCF	4,801.6	3,634.0	10,122.2
Generator Fuel, Lbs.	131,300	85,810	268,550
Gasoline Used, Gal.	13,873	10,948	30,544
Quantities per MCF:			
Generator Fuel, Lbs.	27.4	23.6	26.5
Gasoline, Gal.	2.89	3.01	3.01
Tar, Gal.	0.02	0.02	0.02
Light Oil, Gal.	0.15	0.15	0.15
Net Tersian Factor	1.015	0.968	1.022
Heating Value of Gas:			
Before Compression	555	544	550
After Compression	537	537	537

found in the ash of fires through which equivalent reforming with heavy oil is practised.

Laboratory tests of this gasoline had indicated the optimum enrichment temperature to be at about 1400°F. Table No. 3 gives this and other laboratory data on the gasoline used as well as on the gas oil-Lima crude mixture used in the comparison test run following the gasoline test run. This was verified in set operations whereby the optimum temperature was found to be 1450°F. at the end of the blast period, with 1315°F. at the beginning. The temperature at the top of the superheater ranged from 1280°F. at the end of the blast to 1213°F. at the beginning. The average depth of fuel bed was 84", with an air blast pressure at the base of the generator of 50".

Variations in set temperatures were made for periods of about one hour each to determine respectively the appearance of uncracked oil, naphthalene, and lampblack with the result that a temperature of 1350°F. to 1400°F. at the base of the superheater gave uncracked oil at the washbox overflow seal; while at 1500°F. to 1550°F. tests indicated the appearance of naphthalene which had not been evident at 1400°F. to 1450°F.; and at 1550°F. lampblack showed up.

The heating value of the gas was 555 B.t.u. nonreforming and 544 reforming before compression and 537 B.t.u. after compression in each case. The specific gravity during reforming with gasoline went up to 0.664 from 0.654 for nonreforming; and the hydrogen sulphide increased from 65 grains per hundred cubic feet to 70.

The hourly capacity of 88.9 MCF. while running with gasoline nonreforming was increased by 14.5% while running reforming with gasoline. The hourly capacity with the gas oil-Lima crude mixture at the plant was practically the same as with gasoline. Production rates with gasoline for both reforming and nonreforming and also for the gas oil-Lima crude mixture are shown in Table No. 4.

The B.t.u. contributed to the gas per gallon of gasoline was 112,500 B.t.u. or 99.1% of the laboratory figure, with nonreforming and 105,000 B.t.u. per gallon of gasoline when reforming was practiced. This compares with 103,100 B.t.u. from gas oil-Lima crude mixture as observed in this test. Table No. 5 gives data relative to the carburetting factors revealed by the tests.

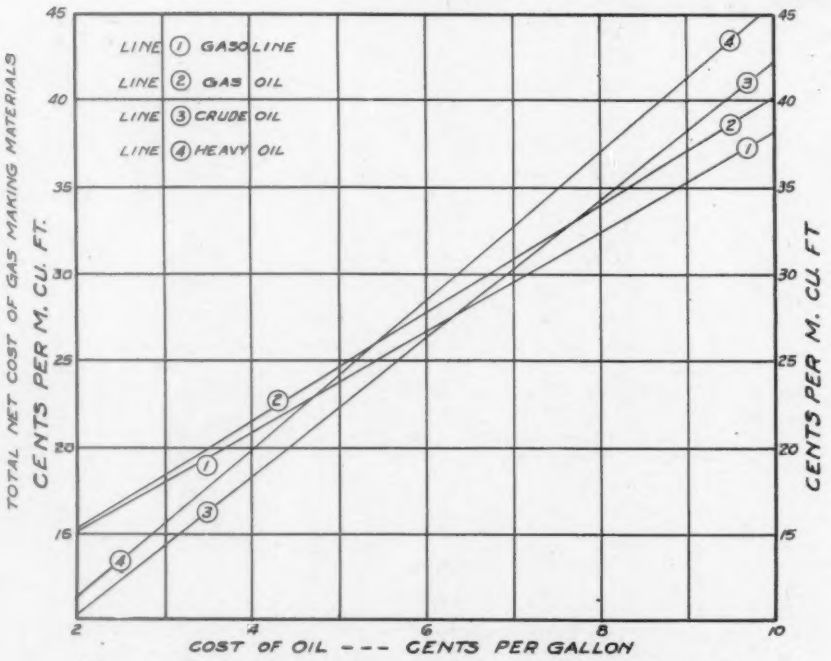


Figure 2—Total net cost of gas-making materials (537 B.t.u. gas)

TABLE 3—Laboratory Cracking Test

	Gasoline	Mixture* of Gas Oil-Lima Crude
Cu Ft. of Oil Gas Per Gal.:		
at 1300° F.	45.06	54.34
at 1400° F.	45.17	52.78
at 1500° F.	42.41	55.39
at 1600° F.	45.02	55.11
B.t.u. per Cu.Ft. of Oil Gas:		
at 1300° F.	2532	2038
at 1400° F.	2540	2083
at 1500° F.	2645	2053
at 1600° F.	2396	2060
Gas Enriching Value B.t.u./Gal.:		
at 1300° F.	114,000	110,800
at 1400° F.	114,800	109,900
at 1500° F.	112,200	113,700
at 1600° F.	107,900	113,500
Tar Formed (Calculated) per Gal. of Gasoline, Gal.:		
at 1300° F.	0.0535	0.1608
at 1400° F.	0.0486	0.1662
at 1500° F.	0.0644	0.1432
at 1600° F.	0.0905	0.1444

* 67.4% Gas Oil; 32.6% Lima Crude.

TABLE 4—Capacity Results for 7' 6" Set

	Gasoline		Mixture of Gas Oil-Lima Crude
	Non-Reforming	Reforming	
Total Hours Running, Hrs.	54.0	35.7	19.9
Gas Made, MCF.	4,801.6	3,634.0	1,794.6
Make per Hr., MCF.	88.9	101.8	90.2
Make per Sq.Ft. of Generator Area, MCF.	2.86	3.27	2.90
Make per Run, MCF.	9.03	10.01	8.27

TABLE 5—Carburetting Factors

	Gasoline		Mixture—Gas Oil-Lima Crude
	Non-Reforming	Reforming	
Total Heating Value B.t.u./Gal.	122,828	122,828	137,900
Enriching Value B.t.u./Gal.:			
From Lab. Cracking Test	113,500	113,500	112,600
From Plant Test Data Computation	112,500	105,000	103,100
Per Cent of Total Heat of Oil Appearing in Gas, %:			
By Lab. Cracking Test	92.4	92.4	81.7
By Plant Test Data	91.6	85.5	74.8
B.t.u. per Cu.Ft. of Gas Due to Oil Gas			
B.t.u. (Before Compression)	325	316	330
Net Tersian Factor	1.015	0.968	0.953

Light oil to the extent of 0.15 gallons per M. was recovered in the high pressure drip. This was the same as observed with gas oil-Lima crude operation. Table No. 6 shows the composition of Light Oil recovered from gas made with gasoline by compression and cooling. It will be noted that the paraffinic hydrocarbon content of light oil produced from gasoline is rather high in the benzol, toluol, and solvent naphtha fractions, and also that the forerunnings are extremely high; so that possibly this light oil would have little, if any, value for nitration or for production of synthetic materials, under present methods of refining and processing light oil. If this should prove to be true, as is now apparent, the permissible price payable for gasoline would be reduced by about 2 or 3 mills per gallon below that indicated elsewhere in this article. For comparison there is also shown the composition of Light Oil recovered at the Poughkeepsie Gas Works using residuum gas oil early in 1937 under conditions of compressing the gas to 50 pounds and cooling under pressure.

TABLE 6—Analysis of Recovered Light Oil

	Carburetting with Gasoline (Kingston 1942)	*Carburetting with Residuum Gas Oil (Poughkeepsie 1937)*
Crude, Distilling above 200° C.	Nil	Nil
Washing and Steam Distilling Loss	22.3%	41.0%
Forerunnings (Paraffins, Etc.)	6.8%	0.0%
Refined Benzol	26.0%	18.9%
Refined Toluol	24.1%	25.0%
Refined Solvent Naphtha, Distilling 140 to 200°C.	10.4%	13.6%
Paraffinic Hydrocarbons Distilling in Benzol, Toluol and Solvent Naphtha Range	8.3%	0.0%
Refined Solvent Naphtha Distilling Above 200° C.	0.8%	1.5%
Refined Distillation Loss	1.3%	0.0%
Paraffinic Hydrocarbon Content of Each Constituent Separated in the Laboratory:		
Benzol	10.3%	0.0%
Toluol	12.1%	0.0%
Refined Solvent Naphtha	15.0%	4.0%

TABLE 7—Gas Making Materials (537 B.t.u. Gas After Compression)

	1 Gasoline	*2 Gas Oil*	*3 Crude Oil*	*4 Heavy Oil*
I—Quantities per MCF.				
A—Generator Fuel, Lbs.	27.30	30.10	25.00	20.00
B—Oil, Gal.	2.89	3.10	4.00	4.30
C—Tar, Gal.	0.02	0.60	1.30	1.00
D—Light Oil, Gal.	0.15	0.04	0.25	0.13
E—Net Oil*, Gal.	2.72	2.46	2.45	3.17
F—Net Tersian Factor	1.015	1.019	0.922	0.963
* Oil chargeable to gas making after deducting residuals.				
II—Prices per MCF.				
A—Fuel @ 0.4¢/Lb.	10.92	12.04	10.00	8.00
B—Oil @ 6¢/Gal.	17.34	18.60	24.00	25.80
C—Tar @ 4¢/Gal.	.08	2.40	5.20	4.00
D—Light Oil @ 10¢/Gal	1.50	.40	2.50	1.30
E—Total Net Cost	26.68	27.84	26.30	28.50
EE—Total Net Cost at the Price of Oil Shown:				
1—Oil @ 2¢/Gal.	15.12	15.44	10.30	11.36
2—Oil @ 6¢/Gal.	26.68	27.84	26.30	28.50
3—Oil @ 10¢/Gal.	38.24	40.24	42.30	45.70

The quantity of tar produced with gasoline was carefully determined except for possibly a small portion of it which may have been lost in the relief holder. All the drips and the tar separator had been entirely cleaned of tar before the test started and were completely emptied after the test ended, and there seemed to be no question that tar production with gasoline was extremely small. The quantity collected was equivalent to 0.02 gallons of tar per MCF.

A Net Terzian Factor, after allowing for light oil and tar production, averaging 0.992 for reforming and nonreforming combined was evident for the gasoline. This compares with the corresponding factor of 0.953 for the gas oil-Lima crude mixture used. The Net Terzian Factor is arrived at by adding 100 times the net oil per MCF. (after deducting tar and light oil) to 10 times the generator fuel per MCF. and dividing the sum by the B.t.u. of the finished gas.

Table No. 9 gives the data for each of the three tests, together with computations showing the net total costs for gas making materials for: (1) gasoline reforming, (2) gasoline nonreforming and (3) the gas oil-Lima crude mixture. The prices for materials shown in Table No. 9 were those paid for the materials used without allowance for any possible reimbursements from governmental agencies for taxes paid in the original purchase price of gasoline.

Items 24 through 31 in Table 9 indicate that, aside from capacity considerations, the choice of reforming or nonreforming with gasoline would depend upon the relative costs of generator fuel and gasoline—low cost gasoline favoring reforming and low cost coke favoring nonreforming.

An indication of the economics involved in the use of gasoline for making carburetted water gas is given in Table No. 7 and Figure 2. Four operating conditions are compared as follows: Column 1 for operation with gasoline, Column 2 for operation with gas oil, Column 3 for operation with a crude oil, and Column 4 for operation with a heavy oil. For simplicity a price of 6.0 cents per gallon is first assumed for all oils in the table and then to obtain data for the graph in Figure No. 2 various prices are assumed for all the oils, with all other unit prices remaining constant in all cases and with unit quantities of materials remaining constant at the values shown in Table No. 7. Under most circumstances it possibly would be inaccurate to use a fixed price for tar regardless of the kind of oil from which it originated, but for purposes of illustration a common price is used for tar as well as for all other materials. If used for boiler fuel, tars from all sources would likely have approximately equal value.

TABLE 8—Comparative Permissible Price Payable for Oils Shown

(Price in Cents per Gallon)			
Gas Oil	*Gasoline*	*Crude Oil*	*Heavy Oil*
(2)	(1)	(3)	(4)
4.0	4.2	4.8	4.4
5.0	5.3	5.5	5.1
6.0	6.4	6.4	5.8
7.0	7.5	7.1	6.5
8.0	8.5	7.9	7.3
9.0	9.6	8.7	8.2

From Figure No. 2 it may be determined just what the total net cost of gas making materials will be (with the prices and operating efficiencies given) for any price for oil between 2.0 cents per gallon and 10.0 cents.

By following a vertical line upward from the price per gallon selected until it crosses the line for the oil in question and reading the cents per MCF. scale horizontally

Table No. 9

Comparison of Gasoline with a Mixture of 67.4% Gas Oil and 32.6% Lima Crude for Gas Making at the Kingston Gas Works.

	1	2	3
1. Dates of Operation: 1942	Nov. 9, 10&13	Nov. 11&12	Nov. 19
2. Oil Used	Gasoline Nonreforming	Gasoline Reforming	Gas Oil & Lima Cr.
3. Source of Oil	Titusville, Penna.	Titusville, Penna.	Refinery and Ohio
4. Analysis of Oil:			
a. Gravity—API @ 60° F., Deg.	63.7	63.7	35.7
b. Heating Value per Gal—B.t.u.	122,828	122,828	137,900
c. Heating Value per Lb.—B.t.u.	20,356	20,356	19,577
d. Carbon Residue—By Wt.—%.	Nil	Nil	0.56
e. Sulphur—Per Cent	0.11	0.11	0.22
f. Viscosity Saybolt Univ. @ 100° F.	28.6 sec.	28.6 sec.	44 sec.
g. Enriching Value — B.t.u./G. (Lab.)	113,500	113,500	112,600
h. Enriching @ °F. Shown	1450	1450	1470
i. Olefins	4.0%	4.0%	13.3%
j. Aromatics	8.6%	8.6%	13.0%
k. Naphthenes	0.9%	0.9%	14.7%
l. Paraffins	86.5%	86.5%	59.0%
m. Available for Enrichment Calc.	92.4%	92.4%	78.6%
5. Analysis of Coke Generator Fuel:			
a. Fixed Carbon	90.6%	90.6%	90.6%
b. Volatile Matter	1.0%	1.0%	1.0%
c. Ash	8.4%	8.4%	8.4%
d. Moisture as Charged	1.5%	1.5%	1.5%
e. B.t.u./Lb. as Charged	13,145	13,145	13,145
f. Fusion Temp. of Ash, °F.	2750	2750	2750
g. Sulfur	0.7%	0.7%	0.7%
6. Average Cycle:			
a. Total Length in Seconds	300	300	300
b. Blow in Seconds and Per Cent	93 & 31	84 & 28	93 & 31
c. Blow Run in Sec. & Per Cent	0 & 0	9 & 3	0 & 0
d. Uprun—in Sec. & %	94 & 31.3	94 & 31.3	94 & 31.3
e. Backrun—in Sec. & %	86 & 28.7	86 & 28.7	86 & 28.7
f. Final Uprun—in Sec. & %	18 & 6.0	18 & 6.0	18 & 6.0
g. Air Purge—in Sec. & %	9 & 3.0	9 & 3.0	9 & 3.0
h. Carburetor Air On—Sec. & %	81 & 27.0	81 & 27.0	81 & 27.0
7. Air:			
a. Generator, Cu. Ft./Min.	5500	5500	5500
b. Carburetor, Cu. Ft./Min.	1800	1800	1800
c. Generator per MCF	944	853	1030
d. Carburetor per MCF	269	243	294
8. Steam:			
a. Uprun—Lbs./Min.	90	90	90
b. Backrun—Lbs./Min.	120	120	120
c. Total—Lbs./MCF	34.7	31.3	26.5
9. Oil Per Run:			
a. Total Gal.	26.1	30.2	26.4
b. Enrichment to Carburetor—Gal.	21.1	24.2	21.5
c. To Generator—Nonreforming—Gal.	5.0	...	5.0
d. To Generator — Reforming — Gal.	...	6.0	...
10. Oil Rate—Gallons per Minute:			
a. To Carburetor	14.5	17.4	15.2
b. To Generator—Nonreforming	3.6	...	3.6
c. To Generator—Reforming	...	4.3	...
11. Oil to Set:			
a. Oil Temperature—°F.	60	60	46
b. Oil Pressure—Lbs. Gauge	40	40	100
12. Temperature at Superheater Base:			
a. End of Blast—°F.	1450	1450	1470
b. Beginning of Blast—°F.	1315	1315	1380
Temperature Top of Superheater:			
a. End of Blast—°F.	1280	1280	1215
b. Beginning of Blast—°F.	1213	1213	1105
13. Temperature where:			
a. Uncracked Oil Appears, °F.	1350-1400	1350-1400	1300-1350
b. Naphthalene Appears, °F.	1500-1550	1500-1550	1500-1550
c. Lampblack Appears, °F.	1550	1550	1500-1550
14. Gen. Base Blast Pres.—In. Water	50"	50"	50"
15. Avg. Depth Fuel Bed—Inches	84"	84"	84"
16. Avg. Wt. per Charge of Fuel—Lbs.	1500	1500	1500
17. Analysis of Gas:			
a. Before Compression			
(1) CO_2 %	6.0	5.2	5.2
ILL %	10.0	9.5	10.3
O_2 %	0.5	0.5	0.6
CO %	29.3	29.6	28.7
H_2 %	32.8	36.4	35.5
CH_4 %	12.4	11.7	12.3
N_2 %	9.0	7.1	7.4
(2) B.t.u. per Cu. Ft.	555	544	553
(3) H_2S—Gr./C (Unpurified)	65	70	100
(4) Sp. Gr. (By Shilling)	0.654	0.660	0.655
17. Analysis of Gas: (Contd.)	1	2	3
b. After Compression			
(1) CO_2 %	5.7	5.0	5.2
ILL %	9.6	9.4	9.9
O_2 %	0.5	0.6	0.6
CO %	28.5	28.6	28.8
H_2 %	33.1	34.7	35.6
CH_4 %	13.3	12.6	12.4
N_2 %	9.3	9.1	7.5
(2) B.t.u. per Cu. Ft.	537	537	531
(3) H_2S—Gr./C.	None	None	None
(4) Sp. Gr. (By Shilling)	0.654	0.664	0.655
c. Blast Gases Top of Generator:			
(1) CO_2 %	9.5	11.4	13.2
ILL %	0.0	0.0	0.0
O_2 %	0.5	0.2	0.6
CO %	11.8	7.5	6.5
H_2 %	0.0	0.0	0.0
CH_4 %	0.0	0.0	0.0
N_2 %	78.2	80.9	79.7
d. Blast Gases Superheater Stack:			
(1) CO_2 %	12.0	13.1	16.3
ILL %	0.0	0.0	0.0
O_2 %	9.0	8.0	3.9
CO %	0.0	0.0	0.0
H_2 %	0.0	0.0	0.0
CH_4 %	0.0	0.0	0.0
N_2 %	79.0	78.9	79.8
e. Uprun Gas Top of Generator:			
(1) CO_2 %	3.6	3.0	3.0
ILL %	0.0	0.3	0.2
O_2 %	0.6	0.7	0.6
CO %	43.8	43.8	43.2
H_2 %	44.6	47.6	47.1
CH_4 %	0.8	1.1	1.2
N_2 %	6.6	3.5	4.7
f. Backrun Gas from Backrun Pipe:			
(1) CO_2 %	7.5	3.7	5.5
ILL %	0.1	0.5	0.2
O_2 %	0.6	0.3	0.5
CO %	35.8	29.5	37.0
H_2 %	50.6	56.8	45.4
CH_4 %	1.4	5.6	3.2
N_2 %	4.0	3.6	8.2
18. Compression:			
a. Pres.—Lbs. Gauge	40	40	40
b. Aftercooler Temp., in °F.	205	205	205
c. Aftercooler Temp., out °F.	85	85	85
19. Running Time: Days	3	2	1
Hours	54.0	35.7	19.9
Avg. Daily Clinkering Time, Hrs.	5	5	5
20. Corrected Gas Made—MCF	4810.6	3634.0	1794.6
21. Make per Running Hour, MCF:			
a. Total	88.9	101.8	90.2
b. Per Sq. Ft. Generator Area	2.86	3.27	2.90
22. Total Runs	532	363	217
23. MCF. per Run	9.03	10.01	8.27
24. Total Quantities:			
a. Coke—Lbs.	131,300	85,810	45,582
b. Oil or Gasoline—Gal.	13,873	10,948	5,744
c. Tar Produced—Gal.	96	72	951
d. Light Oil Produced—Gal.	720	545	269
e. Total Residuals (c+d)—Gal.	816	617	1,220
f. Line b minus Line e—Gal.	13,057	10,331	4,524
25. Quantities per MCF. Metered Before Compression:			
a. Coke—Lbs.	27.3	23.6	25.4
b. Oil or Gasoline—Gal.	2.89	3.01	3.20
c. Tar Produced—Gal.	0.02	0.02	0.53
d. Light Oil Produced—Gal.	0.15	0.15	0.15
e. Net Oil, b—(c+d)—Gal.	2.72	2.84	2.52
26. Net Terzian Factor	1.015	0.968	0.953
27. B.t.u. contributed to Gas per Gal.	112,500	105,000	103,100
28. Cu. Ft. Oil Gas per Gal.	53.6	61.8	61.9
29. B.t.u. per Cu. Ft. Oil Gas	2097	1700	1667
30. B.t.u. per Cu. Ft. Gas Due to Oil Gas	325	316	330
31. Cold Gas Efficiency per cent:			
a. Based on Gross Oil	77.7	80.0	71.3
b. Based on Net Oil	80.1	82.5	81.2
32. Cost—Dollars per MCF.:			
a. Coke @ .0047906 Lb.—$	0.131	0.113	0.122
b. Gas Oil @ 5.5c Gal.—$	....	....	0.176
bb. Gasoline @ 15.6c Gal.—$	0.451	0.471	...
c. Coke Plus Enricher—$	0.582	0.584	0.298
d. Tar @ 5c/M—$	0.001	0.001	0.026
e. Light Oil @ 10c/M—$	0.015	0.015	0.015
f. Tar and Light Oil—$	0.016	0.016	0.041
g. Net: Line c minus Line f—$	0.566	0.568	0.257

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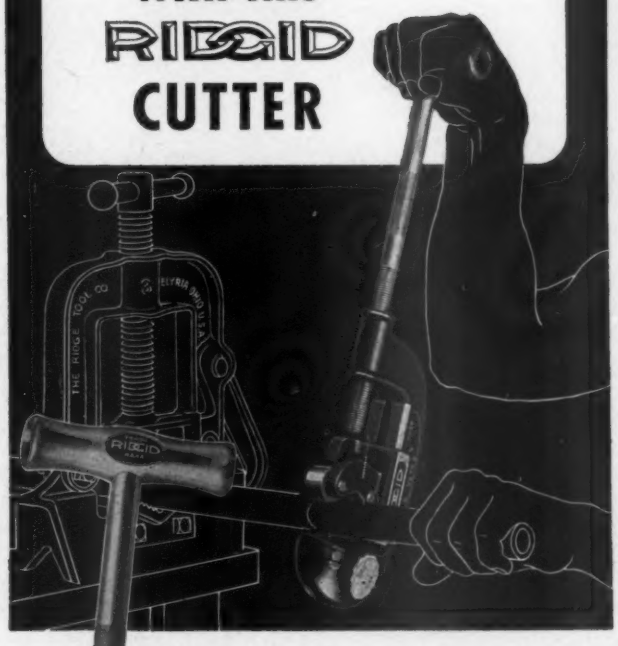

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Manufactured Gas Operations In War Time

By
Martin T. Bennett
Chief of Gas Production Section
Power Division, W. P. B.

THIS OPPORTUNITY to present to you some of our mutual problems which are arising out of our war efforts is one I have been looking forward to. As you know, New England has within its boundaries many of the most important ordnance facilities and other war producers. A great many of these are dependent upon the gas industry for the refined fuel which is needed for their more exact heating operations. While some of these industries may not represent a large proportion of some of the Gas Company loads, they are large enough individually to be the ones that are first thought of when curtailments are required, despite their great importance for war production.

You gentlemen, as operating heads, have tremendous responsibilities which do not end with "keeping the holders up," as was the old gas man's traditional aim. Not only must you keep the holders up, but you must do so without curtailing war industries or essential civilian services. Not only are you expected to do these things but also you have less in the way of facilities and fuels with which to do the job than probably you have ever had before. Possibly some of you have already felt that everything conspires to keep you from fulfilling these important responsibilities at the time when they are of maximum importance. Fuels are difficult to get—transportation troubles are constantly facing you. You do not have an easy job in any sense of the word and nothing that I can tell you is going to make the future appear any easier.

I trust none of you expected to gain hope from anything I might say. I would like much to give you encouragement but I have little to say that is hopeful. Courage must replace hope. The temptation is often present to start curtailments when loads appear to be exceeding all precedented levels. Only within the last few weeks one large company curtailed loads because the send-out was exceeding all previous rates. The curtailment did not last long but within a week the production reached a level 10% greater than on the day in which the curtailments had been made, and it was found that without straining those parts of the plant which were thought to be bottlenecks the larger load was served without curtailment. Some war industries were hurt by the curtailment that actually was caused by lack of courage. We have the same sort of feeling for the operator who made those curtailments that we would have for any other individual who made an embarrassing but somewhat tragic boner. I think probably this boner would have been avoided, had the operators been sufficiently sure of their capacities, which could have been determined by "fire drills" or plant tests prior to the time the peak load was encountered.

Presented for Mr. Bennett by Mr. George L. Schanz of W.P.B. at Meeting of New England Gas Association Operating Division, Boston, Mass., January 7, 1943.

Oil Shortage

Some curtailments have been required this winter by failure of oil shipments to arrive. I do not wish to be understood as saying that these curtailments were caused by lack of courage. When an operator finds one or two days' supplies of oil left in his tanks, he does have a difficult decision to make on whether to take a chance on more oil arriving in time or whether to do everything that can be done, short of an interruption of service in order to maintain gas on his system. When one realizes the difficulties of getting oil to the place where it is needed when it is needed, and when one realizes how sorely certain kinds of oil are needed for shipment to our armed forces, one is apt to become a bit callous to appeals from those who wish to retain a choice of a particular kind and specification of oil.

By and large the gas industry has adapted itself to changing fuels and fuel markets during the many years of the existence of the industry. When Mr. Lowe built his first water gas machine he carbureted the gas with gasoline. It was called naphtha, but it was very similar to the straight run gasoline that is now threatening to glut some petroleum markets. Later the industry went to heavier grades of oil and eventually, as the result of economical developments, a large part of the industry went to the use of residuum and crude oils. Now the industry is competing for this fuel supply with our most important Trans-Atlantic shipping lanes. Further than that, residuum oils which once were competing with the lower grades of solid fuel are now particularly desired fuels and are becoming increasingly scarce.

The operating man is now faced with the probability of having to make gas out of just about anything he can get. Even though we recognize the extremely important position of public utilities in the overall war program, we also must recognize that not even the utility industry is doing its all until it does everything it can

do to get along with what it has. If residuum oils are an absolute necessity because of limitations of set capacity then stocks of this oil should be reserved and used only at those times when the last bit of capacity is required. Similarly, with generator fuel, if large sized coke is needed and is difficult to obtain the larger sizes of coke should be used only at those times when everything is loaded to capacity. At other times smaller sizes of coke may be used, anthracite coal can be used, and in many cases during period of lighter loads bituminous coal can be used. At the western end of the Great Lakes today, companies are using bituminous coal in their generators in order to preserve supplies of coke for peak periods. I do not know how well the industry as a whole is prepared to operate under these conditions. I do not know how many large water gas plants have experimented with bituminous coal operation. I do not know how many have been exchanging information with those companies that have been using bituminous coal. But, if this very disruptive change in operations may suddenly be thrust upon us we should be prepared to make the best of it when it comes.

Gas Enrichment

A minute ago I mentioned the possibility of using gasoline for enrichment, much in the manner that the original water gas set used it. This possibility seems to be etched more deeply on the wall of the industry's future than a mere handwriting scratched by some dreamer. The "big inch" oil line which we hope will be completed this Spring is expected to have a capacity of about 300,000 bbls. of oil per day. This probably will be largely crude oil needed by the eastern refineries in order to produce fuel for ships, high octane gasoline for planes and gasoline and fuel oil requirements of the eastern seaboard. The present requirements of the gas industry in New England and the Middle Atlantic states, which include New York, Pennsylvania, New Jersey, and Deleware will take more than one-ninth of the capacity of this oil line. In order to make crude oil flow through this line it is going to be necessary to flux it by the addition of about ten per cent of low grade gasoline. The refineries will distill this material off and eventually it will come out in what we now call a "slop distillate" which will be no good for internal combustion engines but which should make an excellent carbureting fuel. The transportation cost for this material up to the refinery will be practically nil because the increase in pipe line capacity by virtue of the decrease in viscosity is expected to be far greater than the volume actually transported. This is still pretty much a matter for the future but with a source of a surplus fuel in view there is hope for some economic relief to the gas industry which may in part compensate it for losing its right to secure supplies of residuum oils.

As you know, we have been very much interested in this gasoline problem. We have been working with many operating people in the industry in order to test all of its virtues and shortcomings so that the operating people may know what they have to contend with if this material is suddenly thrust upon them. Probably a large amount of it will be made available upon completion of the big inch oil line. Possibly some of it may not be all straight run but may include a low octane gasoline made by the large cracking plants in Texas which are presently being built for high octane gas and synthetic rubber production.

Nationwide gasoline rationing has begun to produce a surplus of low octane gasoline in parts of the middle west. We expect a large part will be absorbed this winter by the oil refineries themselves in supplanting natural gas supplies which are under heavy curtailment in the middle western states. Serious surplusses of this material are already accumulating in some local areas where limitations on storage capacity and lack of markets are threatening to shut down a number of small refineries.

I dislike very much calling this material gasoline because in the ordinary sense gasoline signifies a fuel for internal combustion motors and the properties which are desired in that type of fuel are quite different from those that are wanted for gassification. We must not let a name blind us to the virtues that the material may have. At one time the Office of Petroleum Coordinator suggested that we call this fuel "motor fuel distillate" and that name seemed preferable to gasoline but it still was not descriptive. I am informed that a specification is being prepared which may secure a fair classification and an exemption from motor fuel taxes which combined with a new name, "gas enrichment oil," may remove some of the prejudices against use of this material for gas enrichment.

Probably many of you are familiar with the tests which have been made by the Detroit Edison Company at the Marysville, Michigan plant, by the Central Hudson Gas and Electric Company at the Kingston plant, by the Wisconsin Power and Light Company at the Fond du Lac plant and by others. None of these have been of sufficiently long duration to develop all of the specific properties which this material may have as a gas enrichment oil. On the good side we have found that the problems of handling a more volatile oil are nowhere near as serious as were at first anticipated. It doesn't squirt from every joint in the piping as some seemed to think it would. In fact it handles through pumps, pipes and valves about as easily as any light oil. Ordinary care would dictate in any case that leaks be stopped rather than being taken care of by hanging a tomato can on a wire to catch the drip. Possibly a different kind of packing should be used on valve stems or on pump rods. The vapor pressure problem seems to be well taken care of by keeping a cap of gas in the storage tanks, so that as the material is drained out, it is displaced by gas instead of by air. Most oil tanks are gas tight or can easily be made gas tight and a vent line to the relief holder will keep a gas cap on the material and will insure against the accumulation of any explosive mixtures. Incidentally, if a vent line is installed to the relief holder it probably would be advisable to install a vacuum break which would prevent siphoning of the liquid and a collapse of the tank crown should it accidentally be filled to overflowing. The mere fact that this material has a low flash point holds little terror for those many operators who have been using crude oils for gas enrichment which includes some constituents even more volatile than those in the gasoline.

Operating Costs

In these days of large loads and serious disruptions of operations, usually the first question that is asked about any change is what effect does it have on capacity? Not only does a reduction of capacity affect the ability to serve loads but of course it also affects the economics of operations. The more hours a set has to operate to make a given volume of gas, the more labor, maintenance, and other costs must be attached to each unit of output. Possibly in many cases, too much concern is paid to capacity. We have found limitations in plant output often are caused by bottlenecks other than the capacity of the water gas sets. Some times bottlenecks are found in condensing

equipment, some times in scrubbing, tar removal, or purifiers. In a number of cases plant piping has been the most serious bottleneck. Elimination of these troubles, however, does not involve the consideration of set capacity.

I do not believe that any of the tests that have been made to date are sufficiently conclusive on the capacity question to justify complete generalizations. In the long run the ability to get the most out of a water gas set is as much one of experience and knowledge of the operators as it is a matter of the fuel that is used in the set. I believe the question of capacity is still somewhat in the theoretical phase and the answer will not be obtained for any individual until such time as that individual may have operated with the material over some considerable period.

In the Marysville tests for example, we found that when using gasoline a portion of it could be injected at the top of the carburetor during the back run. This reforming of about 20% of the gasoline produced a low gravity which, when compensated for by increased blow-run gave an increase in capacity of about 15%. Reforming larger percentages could not be tried because of inability to handle the increased volume. However, this increase in capacity more than compensates for the decrease in capacity which is experienced by a change from coke to bituminous coal. If any large amounts of lamp black were formed they were probably removed by passing through the dense fire. This is one case where reduction in capacity by use of bituminous coal could be compensated for by reforming a portion of the gasoline.

Some have expressed concern about the effect on set capacity of the impending change from Bunker C oil to number two distillate. I do not know of any recent tests that have been made for the purpose of developing a cycle that will give at least as good capacity with number 2 oil as has been obtained with Bunker C operation. We do know that substantial evidence is available that the set capacities may be even greater. For example, Mr. Willien's tests in Louisville several years ago on the use of oil on the backrun for making low gravity gas showed that a large increase in capacity would be accomplished. His calculations and tests showed a yield of 167 cubic feet of 490 BTU per cubic foot of oil gas per gallon of oil put through on the backrun. These tests were made on a twelve foot set making 335 BTU gas with half coal and half coke and using no oil on the uprun. When oil was introduced on the uprun sufficient to carburet to a 500 BTU gas and sufficient blow run made to level off the gravity, the additional volume of gas obtained by reforming a third of the gas oil produced a phenominal capacity of 4,500 cubic feet per hour per square foot of grate area. The oil required was about three gallons per thousand cubic feet.

Another case supports the belief that the more volatile oil will increase set capacity. The Portland, Oregon gas plant makes oil gas in a set similar in many characteristics to a carbureted water gas machine. Normally they use an 8 degree API Dubbs Residue, but when additional capacity is needed, they mix so-called Diesel oil with this Residue oil. They have used mixtures with as much as 60% of the Diesel oil. This amount has produced an increase in capacity of 60%. They believe that a 100% use of Diesel oil will double the set capacity or produce an increase in capacity of 100%.

Fuel Features

It would seem to be fundamental that a fuel with a high hydrogen-carbon ratio would produce a gerater volume of gas than one of a lower hydrogen-carbon ratio. What appears to be another fundamental is that the amount of heat required to crack hydro-carbons is a function of the weight of the hydro-carbon put into the cracking chamber rather than the volume. These two fundamentals, which as yet may be theoretical, appear to indicate that the more volatile hydro-carbon would increase capacity rather than decrease it. The number two fuel oil, which is the more available oil in the East at the present time, would be somewhere between Bunker C and gasoline in its effect on capacity. Whether this conclusion is correct or is only partly correct, time will tell; but I hope it will not take too much time because the answer is tremendously important and must be found soon wherever set capacity is an important limitation.

This much I am sure of, the tests have shown quite conclusively, and from the point of view of the operator it is very significant and valuable conclusion, that one can change from a gas oil to gasoline on an ordinary up-run and back-run or an ordinary up and down-run cycle with practically no disruption in set operation. Turning off gas oil and turning on gasoline right in the middle of a day's operation should not raise any more difficulties in the operation of the set than should be expected by changing from one tank of oil to another. The first indication that a change has been made will be a tendency for the temperatures in the super-heater to increase. Also, the heating value will increase. Both of these things probably should be expected. The weight of hydro carbon injected into the set has decreased although the volume has remained the same, but the oil which has been injected has increased in gas making value. The adjustment of operations for this type of change is nothing new. The operator will know the necessary change in the operating cycle from the change in the temperatures and heating values.

We still have much to learn, however, about the operating characteristics of this material in large checkerless carburetor Water Gas Sets which have been designed primarily for operation of residuum oils. I cannot feel that the problems which would arise will be beyond the ability of the operators nor can I believe that this confidence in you is the starry-eyed dream of a naive bureaucrat. The operating men of the industry have faced more difficult problems in the past and have found satisfactory solutions.

If we only had to meet the challenge of the fuel situation alone, the story I would have to tell would be a more happy one. But the materials situation has not improved greatly, if at all.

The Demands of War

Back in the days when we were talking in terms of defense and before our actual participation in the war, we were all striving to pull our belts a notch or two tighter in order to make materials available for the necessary increase in the Nation's productive capacities. Steel was needed to produce more steel—manpower was needed to make more machines in order to increase the effectiveness of manpower, and so on. We all looked forward to the day when the increases in production capacity would finally reach a stage where supply and requirements would again strike a balance; but in the meantime all of these increases in productive capacity have greatly expanded our appetites for materials and the availability of many, if not all materials seems to be getting no better. Still, ships and war ships and more ships are needed. More railroad tank cars and open top cars are needed. More steel, gas, and oil pipelines are needed. Demands for additional capital goods for transportation have not ended. These all take steel and many other materials and manpower. Many other war re-

quirements are taking precedence over the gas industry in spite of what has already been considered as the great essentiality of the gas industry.

During this period of capacity expansion, maintenance has been postponed. During this time also, the loads on equipment have reached the straining point. The tank cars, for example, that have been operated at excessive speeds are now showing the strain. Repairs can not be postponed indefinitely and will have to receive a share of materials. Further than that, the materials and supplies in stock have been drawn down, and much of the fat that has been lived on is gone. All these factors will delay the easing of the materials situation for some time. Much can be done within the gas industry however to get along with what it has.

Meeting the Emergency

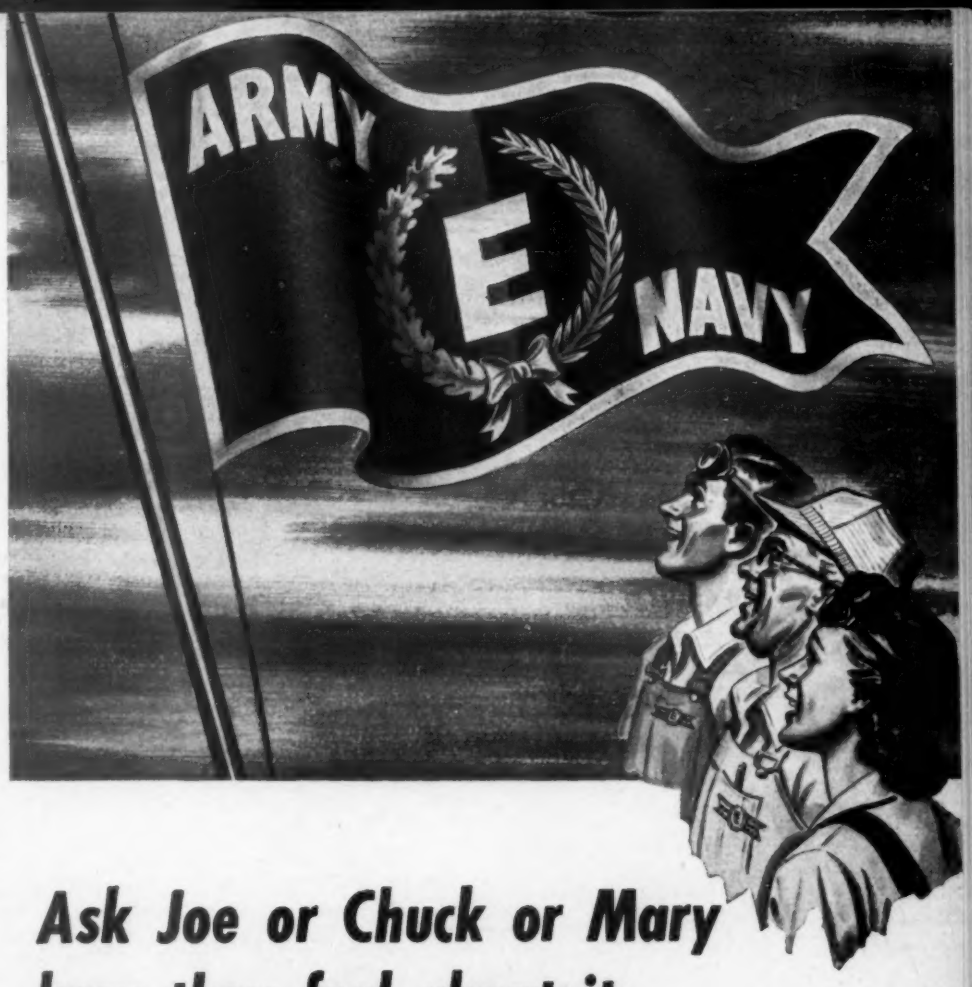
Before long we are going to come to you and ask not only for what you think you need in the way of additional equipment but also what you have that might possibly be spared for use by someone else who may need it more. We are living in dangerous times and must reappraise our standards of safety, particularly as they relate to standby or reserve equipment. The good of the nation as a whole may be served better by having no spare water gas blower at Company A than to have Company B unable to meet its requirements because of failure to get adequate capacity out of its water gas sets. The only other alternative might be to interfere with the completion of greatly needed equipment on the production lines of the blower manufacturers.

The decision on who needs something the most at any time is a difficult one and, of course, mistakes have been made and will be made. I can only ask that we have your confidence that the importance and the needs of the gas industry are well represented when the allocations of materials to the industry are made.

Probably the argument of greatest weight in supporting a claim for the industry is that the industry itself, has within itself, done everything possible to help itself. This is true whether we are asking for materials or for fuel supplies.

As you know, we have tried to secure some kind of a priority rating which would give public utilities a preferred place in the waiting line for fuels.

Perhaps you do not know that our efforts are constantly met with the question—what has your industry done to eliminate non-essential uses?



Ask Joe or Chuck or Mary how they feel about it...

Sure, they're proud.

Sure, their chests swell a little when they look up at that Army-Navy "E" Flag flying above the Estate plant.

They *put* it up there, with the kind of skill and know-how they used to put into Estate Ranges and Estate Heatrolas —that they'll put into them *again*, when the war's over.

They put it up there with something else, too. With a belief in the things we're fighting this war *for*. A belief that makes hands move faster, do each job better, get it done ahead of schedule.

A good many of the Joes and Chucks and Marys at Estate have brothers and sons in the Solomons, in North Africa and some of the other spots around the globe where there's some fighting to be done—and some *dying*, too.

They don't aim to let those boys down. That "E" Flag proves it.

Perhaps even better proof is the way every man and woman in the Estate plant is bending to the job, today, to *better* the production record that earned this proud award.*

The ESTATE Stove Company

HAMILTON, OHIO

HOUSE FOUNDED IN 1842

*Awarded December 12, 1942, and presented in a memorable ceremony on January 2, 1943

Cooperation

Thanks in part to the cooperative efforts of the industry we have been able to show that much has been done. The fine cooperation in enforcing the limitations orders which are assigned to the Power Division for administration is not the only support we have been able to find. The Gas Conservation Program which has been carried on by the industry and by the War Production Board has undoubtedly saved tremendous amounts of fuel as well as aiding the companies in meeting their peak loads. But even greater demands are ahead.

We must recognize the fact that in spite of the long history of surplusses the Nation is faced with shortages of nearly all fuels. It is hard to take, after having pulled our belts as tightly as we have in order to get along with a minimum of construction materials and machinery.

One of the first curtailment orders of the War Production Board limited additional uses of natural gas. This has since been followed by limitations on uses of manufactured gas and on oil. Conversion programs have pushed consumers from one fuel to another. Now we are finding coal shortages in some regions in the country. In some cases these are largely the result of limitations on transportation, but merely blaming it on transportation does not solve the problem. At one time we talked of the oil shortage solely in terms of transportation. Now we are beginning to realize that the declining production in some areas may limit the solution obtainable by increasing transportation facilities. To some extent at least, limitations on manpower and mining equipment may limit the degree to which additional railroad equipment may be able to relieve the solid fuel situation.

As our economy has become more and more one of a warring nation our entire business structure has become part of the war machine. We can afford to waste nothing, and waste is going to mean any use that does not contribute to the maintenance of civilian life or furtherance of the war.

Service Rationing

Rationing of gas service has not been forgotten, although its limitations and shortcomings have eliminated it from among those things to be done first. Certainly it is not fair to allow a gas customer to use gas for househeating without limit while his neighbor is severely rationed on his purchases of househeating oil, if the gas company uses a volume of oil in supplying its househeating customer as great as what that customer would take if he were burning oil directly in his own furnace. This inequity exists today wherever the gas company is using much over four gallons of oil per thousand cubic feet of gas. It exists to a lesser degree wherever space-heating customers are burning any carbureted water gas. It exists to some degree with any of the less essential uses of gas whether these uses are househeating, space-heating, water heating, or many of the commercial or industrial uses of gas.

The gas operator can do much to reduce this inequity by using the minimum quantity of oil in his gas operations. One way that requirements for oil may be kept at a minimum is by using reforming only when need for capacity requires it. Much interest will be directed to the effect on total oil consumption of gas companies which will result from the threatened change from residuum oils to distillates.

Gas Oil Saving

Doubtless most of you are familiar with the excellent paper by Mr. R. E. Kruger of the Rochester Gas & Electric Company which won the Beal Medal for 1941. Mr. Kruger's paper concerned the saving of gas oil by mixing high BTU coke oven gas and blue gas rather than diluting coke oven gas with producer gas, and then making up necessary quantities of gas with standard heating value water gas. Mr. Kruger demonstrates how the high heating value coke oven gas when mixed with water gas, carbureted in varying degrees depending upon load requirements, produced a substantial saving of oil. In effect, he secured 11.8% increase in gas production without the use of oil. The average daily saving was the equivalent of making 45.8 tons of coke do the work formerly done by 5,670 gallons of oil. Certainly the operators of every combination coal and water gas plant should accomplish similar savings unless some other consideration such as light oil recovery makes it inadvisable.

We hope all companies will constantly watch and study the problem of oil conservation. As conditions change, new opportunities may present themselves. If some additional equipment in a plant will allow an ultimate reduction in oil requirements, that equipment should have a priority commensurate with the priorities for stokers that are used in conversion from oil to coal for firing under boilers. The present oil supply situation is desperate. As much as possible should be done now. Believe me, please—this is not alarmism.

In substance, the war program for the manufactured gas industry may be boiled down to two words, "Conservation" and "Preparedness." "Conservation" should apply to everything, but particularly to oil and to critical materials. This is important in New England because of the transportation savings which are needed in addition to the savings in the materials themselves. "Preparedness" is also particularly important in New England because of its location. Changes may come quickly and suddenly. The least that can be done is to be ready for them.

Electrical and Gas Assn. of N. Y. Inc. Re-elects James W. Carpenter, President

James W. Carpenter, Vice President of the Long Island Lighting Company, was re-elected President of the Electrical and Gas Assn. of N. Y., Inc., at its annual meeting held in New York on January 20th. Other officers elected were: First Vice President, S. J. O'Brien, president S. J. O'Brien Sales Corporation; Second Vice President, T. F. Barton, vice president General Electric Company; Third Vice President, T. H. Joseph, president E-J Electric Installation Co.; Fourth Vice President, Norman L. Myers, Eastern manager Electric Appliance Division of Westinghouse Elec. & Mfg. Co.; Treasurer, H. C. Calahan, district manager General Electric Supply Corp.; Secretary, James A. Sackett, sales manager Kings County Lighting Company; and Assistant Secretary, C. A. Norton, sales manager Pierce Laboratory, Inc.

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THE GOODMAN STOPPER

Now has the "Z" handle for easy manipulation. When locked in place it holds. Stopper cannot slip. Gas cannot pass. Adjusted in 30 seconds.

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Nearly a half century of service to the Gas Industry.

Safety Gas Main Stopper Co.
523 Atlantic Avenue, Brooklyn, New York

★ Already they're feeling it . . . And, every day that goes by squeezes the Axis the more . . . For, they are losing the race against time—in Russia, Libya, the South Pacific battlefronts, and in the slave-factories of Europe . . . Because, we—though far from eventual goals—have been able to produce faster than they thought, and, have delivered more material to our beleaguered allies and outposts than they reckoned on.

The achievements of gas and gas engineering in speeding our industrial processes is no small part of this. *Today, ships and planes and tanks have tougher hides and are built faster; guns speak farther and longer; shells and bombs pack a bigger wallop, because of your services to the Nation. And, many of our thousands of producers of war goods are enabled to operate at record-breaking levels only because you are keeping gas pressures up—to put the pressure on the Axis.*

E. J. LAVINO AND COMPANY

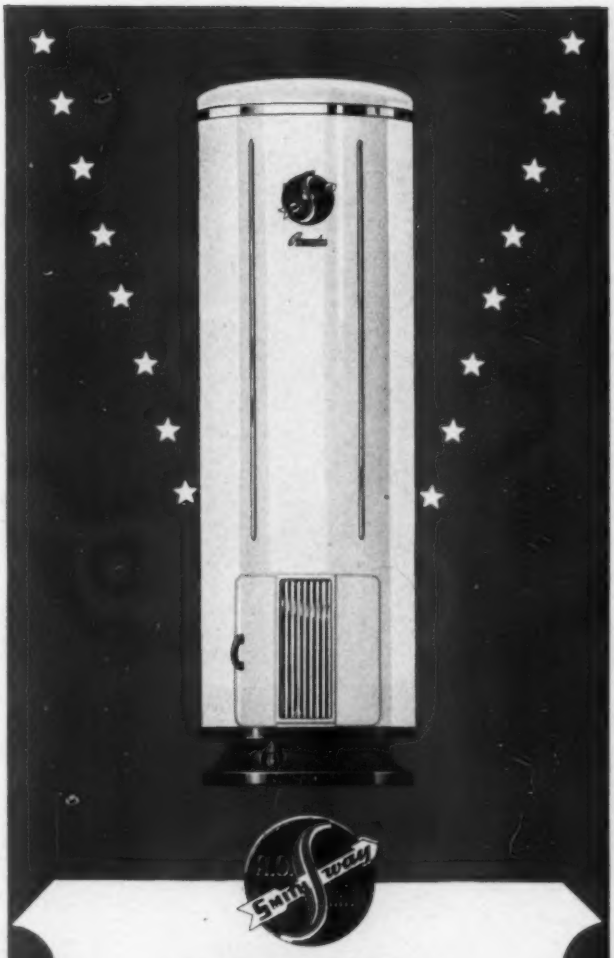
1528 WALNUT STREET, PHILADELPHIA, PENNA.

An increasing number of gas companies use Lavino Activated Oxide to save time, labor and material in gas purification. Not merely a "satisfactory" purifying medium by virtue of incidental properties, it is a material made specifically for maximum H_2S removal. As such, its practical capacity and activity are controlled factors. And, it has maximum activity for trace removal, and maximum shock resistance.

LAVINO "ACTIVATED" OXIDES

GREATER CAPACITY . . . GREATER ACTIVITY . . . LESS OXIDE REMOVES MORE H_2S!

LAVINO ACTIVATED OXIDE



GOOD WILL
To Outlast the War

You probably sold quite a number of SMITHway Permaglas Water Heaters before December 7, 1941. For that, you can be doubly glad. First, because customers who bought them will receive trouble-free service that is appreciated these days when any kind of trouble is double-trouble. Second, because a customer remembers where a product of outstanding merit was purchased long after its price is forgotten.

SMITHway Permaglas
GLASS LINED
WATER HEATERS

A. O. SMITH Corporation
Milwaukee, Wis.

How to Train Women For Gas Company Jobs

By
Lucius S. Flint

THERE'S NO LONGER any question as to whether gas companies should hire women for jobs formerly held by men. The draft has settled that point. The important things now are to decide just where women can be used to best advantage and to find efficient methods for recruiting, training and handling them.

Of course clerical work provides the most obvious opportunity for substitution. There's hardly any job of this type which can't be handled efficiently by a woman. Some utilities have employed as many as several hundred extra women for office positions and have found them universally successful.

The only problem here is that of finding enough women. In some of the more populous communities where there are heavy concentrations of war industry, vast numbers of office girls have gone into the defense plants. However, this condition seems to be improving to some extent—judging from the applications received by the larger gas companies. Indications are that girls who have been used to contacting the public and to the variety of work found in office positions often tire of the monotony of machine operation. Thus, many of them gradually drift back into the open labor market. Of course this means that the aircraft plants and shipyards must draw heavily from the ranks of the housewives who have no previous business experience. Thus, if the war lasts long enough that women are required for a wide variety of gas company jobs, the number available may be pretty small. That's one of the reasons why a good many companies feel that now's the time to begin rather extensive substitutions—before it's too late.

Most companies don't contemplate mass changeovers except as a last resort—due to the cost angle. It's pointed out that most clerical jobs pay more money than outside jobs, that where a male office employee was asked to go on the outside his former wage would have to be continued. This wouldn't be quite so bad if office men could immediately become useful on heavier duties. But in most cases they'd have to undergo extensive training. And then they probably wouldn't be nearly as efficient as men who have been used to working with their hands.

Other Jobs For Women

Other types of jobs on which women have already proved their ability in the gas industry or on which most utility men think they would be satisfactory include the following:

1. Meter reading
2. Customer service
3. In the meter shop
4. As elevator operators
5. As janitors

A number of companies have found women perfectly successful as meter readers. Others haven't had quite such good luck. For instance, one West Coast company reports that both of the two tried out on this duty quit cold the first time they encountered barking dogs.

Because of this experience, that one company has, temporarily at least, switched to high school boys for meter reading. And, they've worked out very well. However, it would be unfair to assume that all women would "fold up" the first time they encountered a fierce dog. Other companies that have gone farther in their experiments with women have found this isn't the case.

Of course girls who are put on as customer service people and those who go into the meter shop require thorough training. But it's exactly the same training given men. No special problem is presented here other than to select women with a reasonable ability to learn about things mechanical.

Neither janitors nor elevator operators require extensive training. And, since these are small pay jobs it's perfectly practical to switch men from them into street maintenance and other heavy duties. In fact, this is likely to be a most advisable step because the opportunity for advancement will hold a class of male personnel which would otherwise go into war work.

Two types of work on which no company was found that had tried women are compressor plant operation and street maintenance. The general feeling is that these jobs are simply too heavy for women.

One company observes that women have proved excellent welders in defense plant jobs and that if worst comes to worst it may be possible to use split crews on street maintenance, having girls do welding and other light duty and providing a few men for digging, heavy lifting and so on. However, such an arrangement has obvious drawbacks and probably won't be adopted unless it should become absolutely unavoidable.

Recruiting

Where women are scarce and it becomes necessary to do some active promotional work to get enough of them, several methods are used. One company has worked almost entirely from the inside. Bulletins were sent out to established women workers asking that they bring in any friends or relatives who would be suitable for certain types of jobs.

One of the benefits of this plan is that the old employees take care of some of the "weeding." Because they don't want their standings jeopardized, most of them recommend only those who have ability and who would fit into utility work.

Most companies have found that where it becomes necessary to advertise it is best to word the copy somewhat vaguely. When war industries are running half-column classified ads featuring specified high hour rates—in some cases up to a dollar an hour—it's almost impossible to compete on a spectacular basis.

The most successful utility ads seem to use small space, discuss long-range opportunities rather than immediate income. Ads of this type tend to attract the more stable women who think of the future—they are naturally the ones who prove out best in gas company jobs.

Utility companies also have at their command another powerful advertising medium which can be used for recruiting—the bill insert. Though no gas company is known to have used stuffers of this type to date, transit companies which have been up against it for women operators have been very successful with a similar medium—the reader leaflet distributed on streetcars and buses.

One western streetcar company has even gone so far as to put up car

cards advertising for women, and with good results. This idea could also be applied in the gas company —by use of display cards or posters on the trucks.

Some Points On Hiring

Every company has its own formula for judging the aptness of the prospective employee. There are a few additional points to consider with women, such as the following:

1. Physical condition as related to the type of work the girl will do—nearly all companies now making extensive use of women have found that it pays to give the medical department a definite voice in the hiring procedure. Each applicant is quizzed carefully by company doctors. The girl who is excessively nervous and upset several days out of the month isn't a "good bet." Of course where a woman is to be used in work involving any lifting at all, this angle is especially important.

2. Age—Of course there are exceptions to every rule but most utilities seem to feel that a girl in her late twenties is the best bet for any sort of physical work. At this age she's past the flighty stage of extreme youth. Yet she's young enough to be healthy and enthusiastic. Some of the largest employers of women consider that the woman who's much over 35 and less than 50 isn't the best risk.

3. Marital status — There's no proven rule to follow on this matter. Some companies are partial to single women, others to married ones. However, here's one point to consider. Where marriage has meant real responsibility and consequent stability —as in the case of a woman whose husband is in the armed forces or who is ill—then the applicant is likely to be a very good risk.

4. Parental status—Here again there's no proven rule. However, a number of very successful personnel managers lean toward the view that the young woman who already has a couple of children—providing she's able to make proper arrangements for their care while working—is a little better bet than a married girl of the same age who has none.

5. Past experience in getting along with people—Though some personnel managers will disagree with this, the majority opinion seems to be that where it's necessary to hire older women some attention should be paid to whether or not they've had any previous experience in contacting the public. It was discovered that in many cases the older woman who has lived a very sheltered home life finds it difficult to adapt herself to new conditions. She often lacks the patience necessary in dealing with customers, even has trouble getting along with other employees. Naturally there are many exceptions but the principle is one to keep in mind.

Beware of Fallacies

Perhaps the best rule of all is to consider each applicant individually, to decide on the basis of sound logic rather than with any pre-conceived theory whether she's a good risk. There are good ones and bad ones in every age group. Some single women are better than other married ones and vice-versa.

It's well to beware of radical theories of any kind. For instance, because some of the earliest mass employers of women discovered that those who were a little on the heavy side often had more endurance than their skinny sisters, some companies jumped to the conclusion that the heavy woman is always the best risk. That isn't the case. In any heavy work, the well-muscled person is the most desirable. But weight doesn't necessarily mean muscle—it may be weakening and even unhealthy fat.

Preparations For Employment of Women

So much for recruiting and selection. Before actually hiring any number of women for new types of work, it will pay you to investigate two other angles—the law in your community governing employment of female help and the physical facilities required for their comfort. Statutes in different states limit in various ways the conditions under which women can be used. California, for instance, until very recently had a regulation requiring that women working between 11 P.M. and 6 A.M. had to be paid time and one-half, furnished with transportation and provided with adequate meal facilities. A number of states now limit the amount of weight a woman can be asked to lift or carry.

The trend is toward relaxing of these regulations during the war. In California, for example, the aircraft plants have finally broken the time and one-half pay requirement on night work. However, it pays to know your ground on all these points.

Of course where women are employed for new types of inside jobs —as in the meter shop—comfortable powder rooms must be set up for them. A couch or two, comfortable chairs and washroom and toilet facilities are absolutely essential. Priority problems incidentally, make it difficult to get necessary plumbing.

Training Program

As was stated earlier, women going into specialized types of work require just the same training as men. And there's no particular problem involved. However, some large companies using vast numbers of female employees have found that women are best trained by women. The idea here is simply that a woman best

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understands feminine psychology and consequently is better able than a man to explain mechanical devices to them. Of course getting a good female instructor may be a problem.

One western company has also retained a Counsellor of Women to aid them with personal problems—matters of how to get along with men employees, how to take care of themselves physically when doing heavy work and so on.

Handling Women On The Job

1. In breaking in women who haven't previously done outside work, stress at the outset the importance of time—the fact that a minute or two lost here and there really cuts into the day's work. Until this point is gotten across, new girls are inclined to waste too much time in idle conversation, it is reported.

2. Give the female employee a definite, day-long schedule of duties so that she'll keep busy without bothering the management for instructions every few minutes. Numerous employers say that women make excellent workers when they have their jobs cut out for them but that they lack initiative in finding work for themselves.

3. On inside work, let the woman employee change from one job to another whenever possible. Women are inclined to be somewhat nervous and they're happier with change.

4. Give every girl an adequate number of rest periods during the day. Most companies say you have to make some minor allowances for feminine psychology. A girl is more confident and consequently more efficient if she can keep her hair tidied, apply fresh lipstick and wash her hands several times a day.

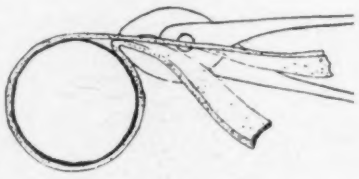
5. Be tactful in issuing instructions or making criticisms. Women are often sensitive; many times they can't shrug off harsh words in the way that men do. *Never* ridicule a woman—it breaks her spirit and cuts her efficiency.

6. See that male employees are reasonably considerate about using strong language around women. Even though a girl's husband or father may swear vociferously, she'll grow to dislike a place of business where she hears too much of this from strange men.

7. If your girls wear uniforms of any kind, get enough size variety that each girl can have a proper fit. This point can't be stressed too strongly as a means of keeping women happy—it's another one of these necessary allowances for feminine psychology.

Useful "Pipe Wrench" Kink

The accompanying sketch shows how easy it is to make a good "pipe wrench" out of a leather strap and a pair of pliers. Wrap the strap around the article to be turned, as shown, and grasp both ends close to the article with the pliers. If it is desired to tighten the thread turn clockwise as in the sketch. If the



thread is to be loosened, simply pull the other way just as with a regular wrench. This idea is of especial value where the article is nickeled or polished and must not be scratched as the leather forms a cushion between the pliers and the metal. If it is thought that a single thickness of leather will not be strong enough it is a simple matter to use two thicknesses or more. Thus the method really has no size limit, provided one has a strap that is long enough. What is more, the strap needn't be leather. Any strong, flexible material will do—even rope.

To be sure, for actual pipe work a regular pipe wrench is better, because pipe wrenches are made specially for the purpose, and one can more easily develop a powerful twisting action through the handle of a regular wrench. Nevertheless, it is well to know about this kink, as we often find ourselves confronted with a job that we think needs a pipe wrench, whereas with a pair of pliers and an ordinary strap the obstacle is easily overcome.

Operating "Kinks"

By

W. F. Schaphorst, M.E.

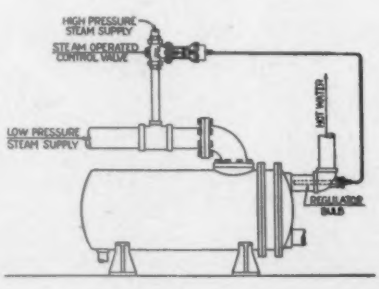
Newark, N. J.

Getting The Most From Exhaust Steam

Every effort should be made to utilize exhaust steam rather than allow it to go to waste. Exhaust steam contains nearly as much heat as high pressure steam, therefore it is nearly as valuable.

In the event that there is not enough exhaust steam for one's purpose it is usually a simple matter to secure the desired result at all times by means of supplementary heat and properly arranged regulating devices.

For example the accompanying sketch shows an excellent and inexpensive piping arrangement and regulator hook-up for economically maintaining uniform water temperature. When there is an ample supply of exhaust steam the high pressure steam control valve remains closed and live steam is not used. However, as soon as there is the slightest decrease in water temperature, the temperature regulator automatically opens the steam valve and admits live steam to the heater along with the exhaust. Then as soon as normal temperature is reached the steam valve automatically closes.



Fuel Rationing Terrors Gone; He Has Gas Well

The I. W. Orrick family, Evansville, Ind., has solved possible rationing of gas, coal and fuel oil with a single stroke of luck.

They had a well drilled in their basement three years ago, but it simply wouldn't produce much water—now they know why.

It's a gas well.

Mrs. Orrick made the discovery when, investigating a gaseous odor, she struck a match. The resultant small explosion and column of flame convinced her. Now they've piped the gas to their furnace and kitchen range.

Portland Gas and Coke Company Builds Good Will By Explaining to Private Customers The "Low-Down" on Gas Heating Situation

By
Arthur J. Larson

TO KEEP its private customers in good humor during war times the Portland Gas & Coke Company, Portland, Oregon, has spared nothing in the way of information to see that its valued patrons know what the score is.

By word of mouth and by letters and folders this utility told thousands of its clients: It's patriotic to heat your home with less fuel during cold weather, because if you save heat your gas fuel will save itself.

People were informed that it was important to save gas because the company was supplying large quantities of gas for war industries, emergency housing, army and navy establishments, and was cooperating with the War Production Board so that all would have some gas to use.

The utility explained to all private users: If there is to be enough fuel for our war industries, homes and businesses, each will have to use fuel far more economically than ever before. The more fuel saved the more it would help relieve the staggering fuel load being carried by the utility's transportation systems—thus making it possible to release vitally needed man-power for war production.

A special slogan was adopted by this company: Gas Is War Material —Use It Wisely. (The smart thing —and patriotic thing is to be constantly stingy with fuel, yet comfortable with heat.)

A convenient "Hang Me Up" card (a card with a hole in one end) carried these words:

"Saving fuel is a responsibility each of us must assume now! It doesn't matter what you use: Gas, briquets, coal, electricity, oil, sawdust or wood. Every fuel is essential to the war effort."

Twelve concise rules were given private users on how to save up to 40% on fuel during cold weather—they being:

1. Close fireplace damper when fireplace is not in use.
2. Close off unused rooms and floors. Shut heat registers.

Gas company customer relations during the war are of vital importance. The company that can keep the good will of its customers during this period of practical "black-out" of gas burning appliances and restrictions in the use of gas, is fortunate indeed. This article outlines the customer relations policy of the Portland Gas & Coke Co.—Editor.

3. Close bedroom doors at night and place rugs against bottoms of doors to prevent cold air from leaking into rest of house.
4. Close bedroom registers at night. Cover cold air registers.
5. Close outside doors promptly. Don't talk in open door.
6. Pull shades at night both to save heat and dim out your house. Pull them in the daytime in severe weather.
7. Close open stairways with heavy curtain or temporary door.
8. Don't overheat your home; set thermostat at 65 degrees during the day.
9. Keep temperature lower than 65 degrees when you are active in the house. At night or when away 50 degrees is warm enough for your house.
10. Fasten window catches securely. Seal cracks with Scotch tape.
11. Maintain correct humidity at all times.
12. Don't use the oven of your gas or electric range to heat your kitchen.

This met with fine response on the part of this utility's customers and made for an increased amount of good will.

This utility believes that in giving the private customer the "low-down" of things that the customer will respond accordingly. What a customer knows he doesn't oppose, but what a customer does not know he opposes.

It was hard to get meter readers for a couple of months. To get private gas users to help in this job a clever card was sent to all gas users headed: "So many of our meter readers have changed from this uniform to uniforms like these . . ."—and pictured were a soldier, sailor and marine. (See illustration.)

Customers were asked by the utility to help out by reading their own meters. Pictured were blank gas meters upon which the recipients were informed how to correctly read and mark meters.

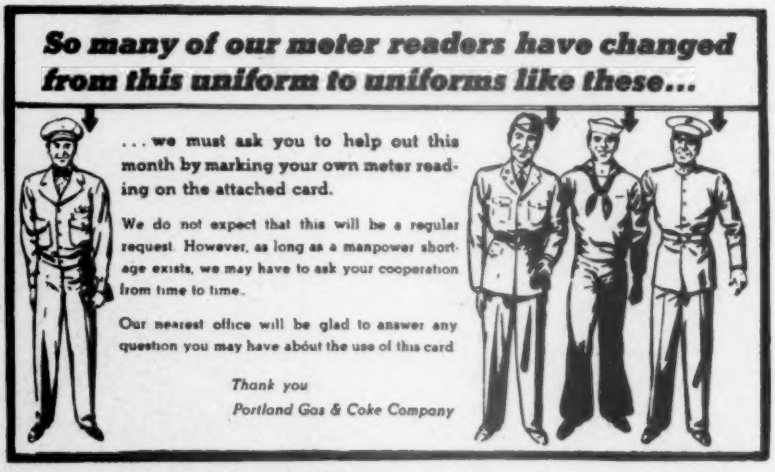
The patriotic appeal was very well received on the part of customers and stupendous good will was created by this clever card.

People are encouraged to ask questions about the low-down on the gas situation. So a customer may ask: What's the heating situation?

A pleasant utility employee will explain: There are really two situations. You see, first we have the wartime "normal"—gas is war material, and all gas users (not just heating customers) are being asked by the War Production Board to avoid its wasteful or inefficient use. This is a conservation program, aimed to relieve transportation and production facilities of needless burdens. So you see the conservation of gas—the avoidance of waste—is simply prudent use of our public service that has to meet abnormal demands during wartime. It's "for the duration." So we ask you to cooperate in this conservation effort. This means to follow the twelve rules.

What's the other situation? customers ask.

The situation, explains the employee, is termed a possible Wartime "Emergency." The greatly increased demand for gas to serve many different wartime activities may result in temporary shortages during any period of extremely cold weather. If we have a real cold spell, such a wartime emergency may be faced. This will call for unavoidable curtailments of gas use during the period of shortage.


So many of our meter readers have changed from this uniform to uniforms like these...
...we must ask you to help out this month by marking your own meter reading on the attached card.
We do not expect that this will be a regular request. However, as long as a manpower shortage exists, we may have to ask your cooperation from time to time.
Our nearest office will be glad to answer any question you may have about the use of this card.
Thank you
Portland Gas & Coke Company

This shows one side of the return post card used by the Company in asking customers to read their own meters.

Well, a customer may ask, Why may there be a temporary shortage?

So the question is answered with this explanation: "In the past year, the Portland area has seen the most amazing expansion of wartime industries in all of its history. This has thrown a staggering burden upon every type of public service enterprise, and especially gas.

"The Portland Gas & Coke Company, for example, is serving 6,462 more customers than a year ago—as much as a whole new city of 20,000 population. We have been called upon to furnish 30% more gas this year than last, an increase of nearly one-third over our previous all-time record output."

Customers can see this and appreciate getting the low-down.

"But," the utility representative will hasten to add, "thanks to our skilled engineering and the forward development of our plant, we were ready to produce more gas than ever before. But with heavy industrial war production demands piled on top of the increased civilian requirements of more than 90,000 customers, it is possible you will be asked to restrict your use of gas during extreme cold weather, so there will be enough available to meet all essential needs."

So customers invariably say, "I see now why the necessity for this exists when I stop to consider that the demand for gas on a cold day is ordinarily twice as great as on a day not so cold."

What shall I do in case of emergency? customers ask.

They're told: Shut off heat completely from all rooms except those essential to restricted living. In most cases, only the kitchen, living room and possibly the bathroom will be heated. Shut off at least half of your house. Don't heat bedrooms unless sickness in the family makes this necessary. Remember that the location of your thermostat must be taken into consideration. Do not shut off the heat from the room in which the thermostat is located.

Customers are highly pleased with such information and leave the Portland Gas & Coke Company in a very good frame of mind about the utility. Such good-will is priceless.

And the sign-off in the "low-down" information by this company to customers is this: "Don't hesitate to telephone any time you need advice or help. Just phone us and we'll do our best to take care of your problem.

"Your cooperation is genuinely appreciated by us, and by the men and women who carry the serious responsibility of maintaining gas service in the community under difficult wartime conditions, and by war workers who depend upon gas service to turn out their quota of urgently needed materials for our armed forces."

And as one old-time customer of the utility was alleged to have remarked, "Say, the gas company certinly explains the situation in terms I can understand—if only the OPA was as clear—H'mm! Maybe I should write to my congressman and give him a suggestion that will make him nationally-famous."

Edwin Fulton Appointed Division Manager

Edwin Fulton, former manager of Consolidated Utilities Corporation plants located at Sumter, Anderson and Greenwood, South Carolina, is now identified with the South Carolina Electric and Gas Company in the capacity of Division Manager at Florence, S. C.

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RECENT COURT DECISIONS *Affecting Gas Utilities*

Review of 1942 Important Gas Company Court Decisions

By
Leo T. Parker
Attorney at Law
Cincinnati, Ohio

DURING THE YEAR 1942 the higher courts rendered many important decisions involving gas companies. In order that readers may have ready at hand the interesting and informative data imparted by these decisions, we shall briefly review the important ones. And when advisable for future references we shall include modern court citations to verify explanations of the law on the varied subjects.

Duty of Gas User

According to the decisions rendered by modern higher courts a consumer of gas has the legal duty to know that his own pipes, through which the gas is to be used, are in good order, and the gas company officials are not required to inspect and approve the consumer's piping and other apparatus. On the other hand, the law is different if the gas company employes knew, before turning on the gas, that the consumer's pipes, or other appliances, were defective. The law is well settled that if the company employes know at the time they turn on the gas, or after turning on the gas become aware that there are defects in the pipes, it then becomes their duty to make proper inspection to ascertain the safety of the pipes before the company furnishes or continues to furnish gas through them. Without this actual knowledge neither a gas company consumer, nor his guest, can hold the gas company liable for injuries sustained as a result of escaping gas.

For example, in Miller v. Gas Service Company, 130 Pac. (2d) 547, reported December, 1942, it was disclosed that several rooms in a hotel were heated by gas stoves which were connected to outlet pipes by means of connecting tubing of a type commonly known as "flexible connecting tubing." One day large quantities of gas which had escaped and accumulated in a room, exploded and inflicted severe burns upon a guest who occupied the room. The injured guest filed suit against the gas company to recover damages and alleged that the company "knew, or should have known, that the flexible connecting tube was being used in the hotel and knew, or should have known, that this type of connecting tubing is a faulty, unsafe, and highly dangerous type of connecting tubing due to the fact that the gas has a deteriorating effect upon the tubing that results in sudden and dangerous leakage and escape of gas."

It is interesting to know that the higher court refused to hold the gas company liable, and said:

"It is not alleged that the appellee (gas company) by word, act or conduct, had assumed any responsibility to inspect or supervise the gas appliances or gas connections within the hotel. Boiled down, the allegation is only that the appellee (company) "knew or should have known" that flexible tubing was being used, that such tubing is dangerous in character and that its use was unlawful."

Also, see the leading case of Atlinson v. Wichita Gas Company, 18 P. (2d) 127. This court said:

"The handling of gas required prompt action on the part of the gas company and it devolved upon that company to exercise reasonable care to discover the source of the leak as soon as it received notice that gas was escaping, whether the leak was in the main or service pipes. In a case where notice had been given of such a condition it has been said that: 'It is immaterial in such case that the pipe where the leak occurred was owned by the consumer'."

On the other hand, readers should not confuse the responsibility of a gas company to inspect and repair its own pipes and equipment. Various modern higher courts have held that a gas company is held to a high degree of accountability for the maintenance and conditions of its own lines or pipes, and may be charged with knowledge of defects therein.

But, see Wilson v. East Gas Company, 42 N.E. (2d) 180, reported April, 1942, in which the higher court refused to hold a gas company liable for injuries caused by explosion of gas. In this case the testimony showed that a gas company furnished gas to a temporary schoolhouse through a service pipe which was located upon the property of and under the exclusive control of the Board of Education which constructed a sewer line which resulted in damage to the gas pipes. This court said:

"There was nothing in the situation, known to the gas company, which, in the absence of a request by the board of education or its consent thereto, would justify the gas company in shutting off the gas from the board's service pipe. At no time before the explosion did the gas company know of the existence of a dangerous condition or of circumstances rendering it likely that such condition would arise from the making of said improvement."

For variation of the law on this subject, see Texas Cities Gas Company v. Dickens, 156 S.W. (2d) 1010, reported January, 1942. Here a gas company's agent was notified that gas was escaping into a burning building. The evidence proved that the gas was not turned off from forty-five minutes to an hour and one-half after his arrival, and that it would take only a few seconds to cut off the gas. A city fireman was

seriously injured as a result of an explosion of gas. In holding the gas company liable in heavy damages for the injury, the higher court said:

"The evidence in this case is ample and sufficient to sustain the finding of negligence and proximate cause against the appellant (gas company) in failing to cut off the gas flowing into the building within a reasonable time. When the appellant, through its superintendent Burke, discovered the fire, explosion, and escaping gas, it then became its duty to exercise ordinary care to cut off the gas."

Court Refused to Reverse Jury

Very frequently the evidence is conflicting which pertains to damages to persons and property caused by explosions. In other words, under one set of circumstances the gas company is not liable, but under other testimony the company is liable. When this condition exists the court will rely upon the decision rendered by the jury.

For example, in High v. Pacific Gas & Electric Company, 126 Pac. (2d) 911, reported June, 1942, a suit for damages was filed against a gas company for injuries sustained by a person at gasoline filling station when gas escaping from a gas company's gas service pipe allegedly exploded, but the gas company officials contended that it was gasoline fumes that exploded. During the trial both the injured person and the gas company presented testimony tending to prove that actually the explosion resulted from gasoline fumes. However, the jury decided that the explosion resulted from escape of gas fumes, and held the gas company liable. The higher court approved this verdict, and stated law, as follows:

"We have two conflicting theories of the cause of the explosion, with the jury accepting one as true and rejecting the other. While we might conclude from a study of the cold record that the theory advanced by the witnesses for defendant (gas company) seems more probably correct and supported by better reason we cannot disturb the verdict and judgment unless we can reach the conclusion that the evidence supporting the judgment is inherently improbable or unworthy of belief. This we cannot do."

Also, in the leading case of Hamilton v. Pacific Company, 12 Cal. (2d) 598, the court said:

"It may be confidently declared that founded upon the evidence, the jury not only is authorized to make any logical and reasonable deduction, but also that the jury is the exclusive judge of the weight and value of the inference that may be drawn by it. The fact that some inference other than that which has been drawn by a jury may appear to an appellate tribunal to be the more reasonable, affords no sufficient for disturbing the inference in question."

Carelessness Avoids Suit

In all litigations involving injuries to persons the important consideration is: Did the gas company officials and employes practice negligence which was the proximate cause of the injury or was the injured person's carelessness the proximate cause?

For example, in Hargan v. Louisville Company, 159 S.W. (2d) 50, reported March, 1942, the testimony proved that gas company employes left a pile of dirt in a street while removing a pipe line. One night the driver of an automobile had a bad accident at a location where the dirt blocked the street and he sustained serious injuries for which he sued the gas company for damages. He introduced testimony that the gas company employes were negligent in failing to maintain sufficient warning

ON GUARD

Prize winning photograph by Mel Jones, of Southern California Gas Co., South Gate, California.

IN today's gigantic production drive, the gas industry is playing an increasingly important part, and many companies are depending upon Connelly Iron Sponge to guard against inefficiency and waste in its purification processes.

Connelly Iron Sponge has for the past 65 years, proven its worth in the purifying systems of leading gas companies all over the country. Its cost per 1000 feet of gas is exceptionally low and its unusually long life and revivifying properties insure low operating costs.

Consult Connelly

Connelly engineers will be glad to make a thorough analysis of your purification problems and submit unbiased recommendations without obligation. Write us, today.

Connelly IRON SPONGE & GOVERNOR COMPANY
CHICAGO, ILL. • ELIZABETH, N. J.

lights upon the pile of dirt. However, during the trial the counsel for the gas company proved that the injured driver knew that the pile of dirt was in the street. Therefore, the higher court refused to hold the gas company liable, and said:

"We think it clear that the proximate cause of the collision was appellant's (injured driver's) own action in operating the car in the manner he did. . . . Certainly, the failure of the appellee (gas company) to maintain lights for the purpose of disclosing this dangerous situation, the negligence relied on by appellant, (driver) was not the proximate cause, since the lights would only have served to reveal a situation of which the appellant (injured driver) was fully aware."

Therefore, it is quite apparent that irrespective of negligent acts of gas company employes, the company can avoid liability for resulting injuries if the testimony indicates that actually the negligence of the injured person was the proximate cause of the injury. This rule of law is applicable to all injury cases.

Commission's Order Void

Modern higher courts recognize the fact that natural gas has become so generally used and may be so dangerous to its users that the public interest demands that proper safeguards be furnished by those who distribute it. Therefore, all laws intended to safeguard gas users and consumers are looked upon with favor by the courts. However, the courts will not uphold the validity of an ambiguous law of this nature.

For example, in Lone Star Gas Company v. Kelly, 165 S.W. (2d) 446, reported November, 1942, it was disclosed that a Public Service Commission through authority of a state law issued an order which provides that the malodorant agent to be introduced into natural gas shall be of such character as to indicate by distinctive odor the presence of gas when such gas is present in concentrations not greater than one per cent by volume.

This order meant that gas shall be given an odor by adding an agent that will vaporize, dissolve in or be so mixed with gas as to produce an odor readily perceptible to a normal or average olfactory sense of a person coming from fresh, ungasified air when gas is present not more than one part to ninety-nine parts of air in cases of natural gas.

It is important to know that the higher court held this order void, because it defeats its own purpose in declaring it the duty of the distributor of gas to odorize the same only when gas is present to the extent of one per cent by volume or less. This court said:

"To warn of the presence of such gas and thereby to avoid tragic consequences is clearly the commendable purpose of both the legislature and the commission in requiring its odorization. A good purpose cannot justify a wrong method of its achievement. The inexorable command is that a statute, * * * must accord due process of law. Nothing is paramount to that requirement. The security of property, life, and liberty depend upon its observance. * * * Hence, the duty to declare the statute void is plain, although the occasion of its performance is most regrettable."

Franchise Held Void

It is well established law that a gas franchise is void which technically violates any provision of a State Constitution or State Statute. A recent higher court held a gas franchise void which was to continue for twenty years after the present franchise expired. The Constitution limited the length of franchises to twenty years.

For example, in Peoples Gas Company of Kentucky v. City of Barbourville, 165 S.W. (2d) 567, reported July, 1942, it was disclosed that Peoples Gas Company of Kentucky possessed a franchise, created and sold to it by the city of Barbourville, for the purpose of operating a gas plant within the corporate limits of the city for the benefit of it and its inhabitants. The franchise expired by its terms on August 10, 1941, and pursuant to the provisions of a State law the company served notice on the city that it desired to continue the operation of a gas plant in the city after the expiration of its then franchise. The franchise was granted and contained a stipulation that it would not be effective until several months in future but would continue for twenty years thereafter.

It is interesting to observe that the higher court held the franchise was violative of a constitutional provision limiting the franchise to twenty years. This court said:

"The ordinance which the city enacted creating the new franchise plainly offended the interpretation of our Constitution in that it provided for a limitation period of the franchise to commence at a future date and continue for twenty years thereafter."

Validity of Gas Sale Contract

If the language used in a contract is fairly susceptible of more than one interpretation, it is the duty of a court, in ascertaining the true intention of the parties to consider the subject matter of the contract and the *surrounding* circumstances existing *when such contract was executed.* The application of this rule is not to vary or contradict the terms of a contract, but is to aid the court in ascertaining the true intention of the parties expressed in such contract as they understood same.

For illustration, in Lone Star v. X-Ray Gas Company, 164 S.W. (2d) 504, reported May, 1942, it was shown that a purchaser contracted in writing to purchase or receive gas "in the usual conduct of its business," and also the contract contained the provision that "the purchaser will endeavor, so far as operating conditions will permit, to apportion gas taken from this field on the basis of capacity and rock pressure of wells." In other words, the vendor in the contract agreed to sell and deliver to the vendee, and the vendee agreed to receive and pay for, certain gas "in the usual conduct of its business".

Litigation developed when the seller contended that the purchaser was obliged under the contract to purchase all the gas produced by the well.

During the trial it was shown that for six years the parties construed the contract to mean certain things, and operations during that period of time were carried on pursuant to such construction. Different parties now in suit later acquired ownership of the stock of the corporation originally holding the contract, and these parties construed the contract differently.

The higher court stated important law, as follows:

"The contract should be considered as a whole, in order to give effect to its general purpose and the true intention of the parties. If the intention of the parties who executed this contract can be fairly ascertained from a consideration of the entire instrument, such intention will not be permitted to be defeated by ambiguities or inconsistencies therein. We think the trial court properly heard evidence in order to enable it to ascertain the true intention of the parties. This is so because when the entire contract is considered in the light of all the surrounding facts and circumstances existing when same was executed, it can not, on its face, be construed as an unconditional obligation on the part of defendant (purchaser) to take and pay for all the merchandise gas that this well was or is capable of producing."

War Production Board

Manufactured Gas

Limitation Order L-174 as Amended January 1, 1943

Because of increased manufactured gas requirements for war production and civilian uses, because of scarcity of materials for the construction and operation of manufactured gas plants, mains and other facilities, and because of shortages of transportation facilities to haul fuel and materials used in the production of manufactured gas, shortages of manufactured gas have occurred in certain areas of the United States and are threatened in others.

The limitations upon deliveries of manufactured gas hereinafter ordered are necessary in order to maintain deliveries of manufactured gas to war industries and essential civilian services;

Now, therefore, it is ordered:

Gas system operations. (1) Each utility shall so operate its gas manufacturing, transmission, storage, distribution, and other facilities, as to achieve so far as practicable the maximum output of gas in any area in which a shortage of manufactured gas exists or is imminent. Where necessary for the above purposes, the Director General for Operations will from time to time issue directions as to the operation of gas manufacturing, transmission, storage, distribution or other facilities, and as to deliveries of gas.

Each utility shall, as soon as practicable, make an investigation of the type, amount, and availability of any manufactured gas production facilities owned by or operated by any non-utility producer located in or near its operating area, whether or not interconnected with such utility, and shall make such arrangements (including arrangements for interconnections where feasible) as can be made by means of voluntary agreement among the parties and as may be necessary or advisable to meet or to anticipate shortages of manufactured gas. Where such arrangements require the use of materials in excess of those available under any priority order issued by the Director General for Operations, application for authority to use or to acquire such materials shall be made to the Director General for Operations in accordance with established procedures. In any case in which efforts to complete voluntary arrangements fail, the utility shall report the fact to the Director General for Operations, setting forth all pertinent information. The Director General for Operations will, where necessary to accomplish the purposes of this order, issue specific directions to utilities and non-utility producers as to the integration of manufactured gas facilities.

Upon notice from the Director General for Operations to any non-utility producer that a gas shortage exists or is imminent in any area served by any utility with which such non-utility producer is interconnected, such non-utility producer shall so order its operations as to make available for delivery to such utility all manufactured gas which it is capable of producing or supplying and which is not essential for its own operations, unless the Director General for Operations shall, upon application, determine that such gas, because of differences in heat value or chemical composition, cannot practicably be mixed with the gas supplied by such utility. It shall also make available for delivery to such utility further quantities of gas in accordance with directions of the Director General for Operations.

Limitations on deliveries of manufactured gas. (1) In the event of a gas shortage in any area, each utility supplying such area shall reduce deliveries to consumers in accordance with the following schedule and with such further directions as the Director General for Operations may, from time to time, issue: *Provided,* That to the extent, if any, required by the emergency nature of the shortage, such utility may in the first instance reduce deliveries without regard to such schedules, but shall as soon as possible thereafter readjust its operations and deliveries to conform in all respects to such schedule during the continuance of the gas shortage.

First, the utility shall, within the limits of its contractual rights, reduce deliveries to all consumers purchasing manufactured gas under contracts permitting the supplier to interrupt deliveries: *Provided,* That deliveries of gas necessary for the maintenance of the war production and essential civilian services shall be reduced only to the extent that the fuel requirements for such production and services can be supplied from the consumer's standby facilities.

Second, the utility shall without regard to its contractual rights or those of any consumer, reduce deliveries to all consumers who have standby facilities to the extent to which the operation of such facilities can directly or indirectly alleviate the shortage of manufactured gas in the area.

Third, the utility shall to the extent necessary, reduce deliveries to all commercial and industrial consumers except to the extent that such deliveries are necessary for the maintenance of the war production and essential civilian service or to prevent permanent damage to the production facilities of such consumers. Such reductions shall be made insofar as practicable on a uniform proportionate basis.

Fourth, if after effectuating the reduction in deliveries of gas required by or pursuant to the foregoing provisions of this paragraph, it becomes necessary to curtail deliveries of gas for the maintenance of the war production and essential civilian service, the utility shall insofar as practicable reduce such deliveries on a uniform proportionate basis.

Notwithstanding any other provision of this order, if the Director General for Operations, after investigation, shall determine that any consumer having standby facilities has failed to provide himself with an adequate supply of fuel for the operation of such standby faciilties despite the availability of such fuel, the Director General for Operations, may prohibit deliveries of gas to, and acceptances of gas by, such consumer to the extent that his requirements of gas could have been decreased through the operation of such standby facilities. (Italics ours—Ed.)

The Director General for Operations may issue such directions with respect to reductions in deliveries to residential consumers as may be necessary to alleviate gas shortages.

The Director General for Operations may require any utility to file a specific curtailment schedule listing consumers proposed to be curtailed and the order of their curtailment during gas shortage and may issue such directions with respect thereto as may be necessary to assure compliance with the provisions of this paragraph.

Whenever any utility is obliged to reduce deliveries to any consumer, such utility shall so inform each consumer to be curtailed, and each such

consumer shall, upon such notification, reduce his acceptance of deliveries of manufactured gas in accordance with such notification.

Whenever any utility finds it necessary to reduce deliveries, such utility shall immediately notify the Power Division of the War Production Board, Ref.: L-174, of such curtailment by telegram. Following each such curtailment, the utility shall submit to the Power Division a detailed report of the duration of curtailment and the extent to which deliveries to such consumers were curtailed. Such report shall be filed on Form PD-628.

Restrictions upon deliveries to consumers other than domestic consumers as amended Jan. 20, 1943. No utility shall deliver manufactured gas to any consumer other than a domestic consumer, and no consumer other than a domestic consumer may accept such deliveries, for the operation of any gas-fired equipment (including space-heating equipment) which was not installed (or if converted from some other fuel, such conversion was not completed) at the same premises prior to September 1, 1942, unless:

(1) Such equipment is non-space heating equipment and has an aggregate input capacity of less than 150 cubic feet per hour.

(2) Such equipment replaces similar type gas-fired equipment of equal or greater capacity previously installed or operated by the same consumer at the same premises for the same purposes, or

(3) Such deliveries are specifically approved in advance by the Director General for Operations. Any consumer or utility which considers that such deliveries are necessary for war production or the operation of an essential civilian service may apply for such approval to the Director General for Operations.

Any utility which considers that the capacity of its gas manufacturing equipment and the supply of fuel oil, coal, coke or other fuel available for gas manufacturing are sufficient to take care of all existing and estimated future requirements of war industry and unrestricted civilian use, may apply for exemption of the system or any portion thereof from the provisions of this order or any direction issued hereunder to the Director General for Operations who may grant such exemptions or take such other action as may be consistent with the purposes of this order.

Applications by all consumers for exemption from the space-heating restrictions of this order shall be made on Form PD-673. Applications by non-residential consumers for exemption from the restrictions on deliveries for non-space heating purposes shall be made on Form PD-672.

Petroleum Administration for War Part 1526—Marketing Fuel Oil

Petroleum Administrative Order 3 Issued January 18, 1943

The fulfillment of the requirements for the defense of the United States has created in certain areas a shortage in the supply of fuel oil for defense, for private account, and for export; and the following order is deemed necessary and appropriate in the public interest, to promote the national defense, and to provide adequate supplies of fuel oil for military and other essential uses:

Restrictions on delivery of fuel oil. (1) Fifteen days after the effective date of this order no person may deliver or otherwise supply fuel oil to any commercial, industrial or governmental consumer for purposes other than furnishing space heating or hot water and no such consumer may accept delivery of fuel oil for such purposes unless:

In the case of a commercial, industrial or governmental consumer whose use of fuel oil is exclusively in any operation or operations listed in Schedule A, he shall first have filed Form PAW 1, in accordance with this order.

In the case of any commercial, industrial or governmental consumer whose use of fuel oil is not exclusively in any operation or operations listed in Schedule A, he shall first have surrendered the fuel oil ration issued to him by the Office of Price Administration for redetermination pursuant to 1394.5402 of Ration Order No. 11, as amended, of the Office of Price Administration.

The Petroleum Administrator for war may from time to time certify to the Office of Price Administration for appropriate action any modification of the fuel oil ration of any commercial, industrial or governmental consumer, whether or not such consumer's operations are listed in Schedule A, which the Petroleum Administrator for War may determine to be necessary or appropriate. The Petroleum Administrator for War shall send a copy of such certification to the consumer affected thereby and to the appropriate Regional Office of the Office of Price Administration. The consumer shall immediately present his copy of such certification to his war price and ration board or to such State, District or Regional Office of the Office of Price Administration as may be designated by its Regional Administrator for the region in which the consumer's board is located, and such board or office will thereupon take appropriate action for the cancellation or withdrawal of all or any part of his ration or for the increase of his ration, in accordance with the certification of the Petroleum Administrator for War.

Certification required for delivery of fuel oil. Paragraph (1) requires that a certification be delivered to the delivering supplier before the first delivery of fuel oil to the consumer subsequent to fifteen days after the issuance date of this order, signed by a duly authorized official:

Schedule A as applied to gas industry.

* * *

Public utility services, including the production, generation, transmission, or distribution of the following for general use by the public:

Manufactured gas.

(Note: Copies of Form PAW 1 will be furnished to the oil suppliers by governmental sources. The oil suppliers will furnish copies to their gas company customers.

Appliance Repairs

OPA, Retail Trade and Services Division, has issued a brief bulletin —No. 1, RTD39-on "Repair, Maintenance, and Rental of Radios, Gas and Electrical Appliances" giving the main points of Maximum Price Regulation No. 165, as amended, applying to residential gas appliances and accessories sold in connection with residential gas service.

Copies may be obtained from OPA Regional or State Office—not from Washington—which maintains only a small supply for distribution to trade associations and publications.

F. P. C. Jurisdiction

The United States Supreme Court on January 11, affirmed a decision by a three-judge Federal District Court which held that after the passage of the Natural Gas Act, the Federal

Power Commission acquired exclusive jurisdiction over interstate sales of natural gas for resale. The case involved a contract under which the Appellee sold gas produced in West Virginia to the Portsmouth Gas Company, for distribution in Ohio. The Ohio Commission directed United to submit testimony and exhibits to show a reasonable and just rate to be charged by it for furnishing natural gas to Portsmouth. The District Court held that although prior to enactment of the Federal statute it was permissible for the State to regulate local features of interstate commerce in gas, after passage of the Natural Gas Act such regulation was vested exclusively with the FPC.

Use of Tin in Gas Meters 1001.3 Supplementary Order M-43-b.

(b) Restrictions on use of tin in certain gas meters. After February 15, 1943, notwithstanding the provisions of any state statute or governmental regulation, no person shall use tin-bearing solder or other tin-bearing material in the adjustment, internal repair, or resealing of any tin-cased gas meter having a rated capacity of less than 300 cu. ft. per hour except:

(1) A meter which is found not to be accurate within an accuracy range of plus or minus 4% when tested by standard meter prover tests; or

(2) A meter which has not been previously repaired internally for twelve years or more.

The restrictions of this paragraph (b) shall not apply to any such gas meter which was withdrawn prior to January 26, 1943, for the purpose of testing and returning it to service.

(c) Appeals and communications. Any appeal from the provisions of this order shall be made by filing a letter in triplicate, referring to the particular provision appealed from and stating fully the grounds of the appeal. Such appeals and all communications concerning this order shall, unless otherwise directed, be addressed to the War Production Board, Tin and Lead Division, Washington, D. C., reference: M-43-b.

Issued January 26th, 1943.

Krug Named WPB Power Director

War Production Board Chairman Nelson has announced the creation of the Office of Power Director with the appointment of J. A. Krug as its head to take over complete responsibiilty within the War Production Board for electric power, gas, water and communication.

The Office of Power Director will include the present WPB Power Division and the Communications Equipment Division. Also transferred to the Office of Power Director are the functions and responsibilities of the Facilities Bureau and the Resources Agencies, insofar as they deal with electric power, gas, water, and communications. Mr. Nelson said that on all policy matters the Power Director will report directly to him, while reporting as to administrative matters to the Program Vice Chairman.

All War Production Board orders affecting the utilities will be issued by the Power Director. Pursuant to determinations of the Requirements Committee, his authority includes approval of projects, allocation of materials and critical components, within the power and communications fields and allocations and rationing of utilities services.

The Office of Power Director will have the status of a Claimant Agency before the Requirements Committee on a level with the Army, Navy, Office of Rubber Director, and others. The Office will also be the liaison between WPB and other government agencies which are interested in the utilities under its jurisdiction.

Bituminous Coal Prices

Secretary of the Interior Harold L. Ickes announced January 12th that the Bituminous Coal Division has instituted a proceeding for making such revisions in minimum soft coal prices as may be found necessary under provisions of the Bituminous Coal Act. The Boards contend that minimum prices for the Appalachian field should be raised because of cost increases of more than 5 cents a ton over costs of production as last determined by the Division.

Gas Appliance Development

(Continued from page 9)

especially difficult to regain them. Save them by a package conversion heater and they will become a customer for a future storage water heater.

Commercial Volume Water Heating

All the previous discussion has centered on Domestic Water Heating Equipment. Some of it is used in volume water heating installations. Some heavy duty equipment has been developed and is in use. It has generally given satisfactory service where 140° water has been used. However, with greater quantities of water and the higher temperatures now in demand, most of the equipment now used should receive serious study and be redesigned to meet these requirements with a reasonably longer life expectancy. We are aware that we can supply such equipment, but its first cost is excessive, and we have no low cost fuel to offset it. Consequently, we have offered lighter equipment costing less, but where life expectancy is short. With the advances in metallurgy made in our war effort, equipment can be produced which will give longer life.

To the man who does the
WORRYING
about purification

•

WHAT are the desirable qualities of a good oxide? *Uniformity, consistency in performance and tried economy.* How can we prove that these are the characteristics of GPM Iron Hydroxide aside from our mere statement?

PROOF of the pudding is still in the eating. Out of 5,000,000 bushels of oxide sold in the past two years 3,250,000 were *repeat orders!* This is the record of confidence in *Gas Purifying Materials Co., L. I. City, New York.*

GPM
IRON HYDROXIDE

removes sulfur from gas and wrinkles
from the gas man's brow

Who Killed Cock-Robin?

BEFORE the war, in conversation with several friends—gas engineering friends—who visited the Continent of Europe frequently and more for business than for pleasure, we were told that the Germans were inclined to be boastful of their achievements in the realm of science. Even in gas engineering? we asked; and having heard the affirmative we countered by suggesting that science, and that very minor branch of it, gas making, knows no frontiers, no dividing walls under which men hide for a time waiting till they can "have a pot" with their scientifically constructed pea-shooters against their fellow-men. What brought this to mind is an article by A. K. Bruce which we read in the *Engineer* of Nov. 6. It was about the origin of the internal combustion engine, and had as its premise a remark made by a certain Hugo Güldner in a book of technically high standard (which, unfortunately, we have not read) entitled *Das Entwerfen und Berechnen der Verbrennungskraftmaschinen*—the design and construction of internal combustion engines. In this non-frontier realm of science, Herr Hugo Güldner, acknowledged expert in his particular line of brain selling, made the statement that "Everything that has served to lay the foundations of the internal combustion engine industry and that has helped to make it vital and important is either the product of German thought or was first made practical on German soil." The author of the article in the *Engineer* refused to stand for this; and we ourselves are not exactly enamoured of the idea.

Mr. Bruce pointed to a few home-truths. There was, for example, a "gentleman" or Darby—who, by the way, lived during his inventive period in the parish of Nuneaton—who took out in the year 1791 a patent (British) for a constant pressure combustion turbine. Many believe this to be the first attempt to obtain motive power from the distillation of coal. Then, in 1794, a varnish manufacturer of Surrey, by name of Street, patented an atmospheric gas engine using the "spirits of tar." In 1823, Samuel Brown, of Printing House Square, was active in similar pursuit; so was Brunel in 1825; so was L. W. Wright, of Southwark, in 1833, with his "double-acting gas engine." It was in this year that Otto of the Otto cycle was born. Daimler was born a year later. At the time when Otto had reached the mature age of six and presumably was not averse to Apfelkuchen an ironfounder of breezy Brighton, one William Barnett, had patented quite a serviceable gas engine which was made and sold and proved more successful than many that followed it.

To return to the opening sentence of this note, as far as the Gas Industry goes we think that if needs be we could cock a snoot at the Germans if they suggested that it was really the outcome of German thought. Science knows no frontiers and we are ill-practised in snoot-cocking, but we think we are right in saying that the first public gas-works to be erected in Germany was in Hanover—and the works were erected by a firm of English engineers. Prior to this, Paris had had gas-works, and Paris followed London. Germany, it may be mentioned, did not in her town gas achievements outstrip Baltimore in U.S.A.

And how does Germany stand as a pioneer in another branch of carbonizing—the coke oven? In 1735 Darby, an English "gentleman," was using coke very successfully at Coalbrookdale in Shropshire. In 1750 its use in England became extended. Perhaps it was thought of reward that made John Beal emigrate to America to sell coke. Anyway, in 1813 there was an advertisement in the *Pittsburgh Mercury* to the effect that this gentleman possessed a knowledge of converting "stone coal into coak." We believe that in 1766, at Sulzbach, there was a coke retort installation; but it was crude and proved of little practical value. In France, Knab had a workable process in 1856; and Carvés (France) and Simon (England) made valuable improvements on the Knab oven, and these came to fruit in between the years 1862 and 1873. Germany was also "mopping up" at the time, and in 1881 Hüssner got into his stride on previous thought, and so did Otto, who was helped no end by Hoffman. We think, however, that Coppée, of Belgium, whose oven was introduced on the Continent prior to 1861, and was introduced in England in 1873 and 1874, had—as far as original thought goes—a great deal to do with the development of both the Otto-Hoffman and the Simon-Carvés systems. Of course, we are going back a long way. If we delve further into history, no doubt the Germans would say that the coke oven is obviously of German origin, for did not Julius, Duke of Brunswick, recommend carbonization as long ago as 1584? Our answer is simple. In 1589, Procter, Paterson, and Dudley were hard at the same game and were less theoretical than Julius. Five years later? Think of the time taken for communicating thought in the sixteenth century.

And do the Germans claim first place in the coal tar industry? Henry Haskins, surely an Englishman, was granted in 1746 a British patent for a "new method of extracting a spirit of oil out of tar, and by the same process to produce the finest of pitch." We will jump a year or two and come to Mr. Mackintosh, who was supplied with spirits from coal tar by Dr. Longstaffe and Dr. Dalston, who were responsible for the first coal tar distillery, which they erected, near Leith, in 1822. Ammonia is derived from coal. Who discovered ammonia? Hippocrates (fifth century before Christ), Dioscorides in *Materia Medica* (50 B.C.), or the Dynasty which ruled in Egypt in A.D. 400, and found it profitable to distill ammonia from camel's dung? An Arabian polyphister by name of Al-Garitz wrote a certain amount about ammonia in 869. Whose were the first factories set up for the production of sal-ammoniac? We think the names were Dovin and Hutton and that their factory was in Edinburgh. In any case, the "discovery" of ammonia was made by Priestley (non-Nazi) in 1774.

Science knows no frontiers. Boasting, even on the Nazi system, will achieve no scientific victory—least of all in the sphere of imaginative thought.—*Gas Journal, London.*

Quinn on Nat. Adv. Committee

Gas companies in the six New England states participating in the gas industry's national advertising program have selected J. J. Quinn, general sales manager, Boston Consolidated Gas Company, Boston, Mass., to represent them on the Committee on National Advertising. The New England companies have been without a representative on the Committee since the death of Mr. Cadwallader on November 29, 1942. On various occasions when it was impossible for Mr. Cadwallader to attend meetings of the Committee Mr. Quinn substituted for him, and is therefore familiar with the advertising program as it has developed over the last year or so.

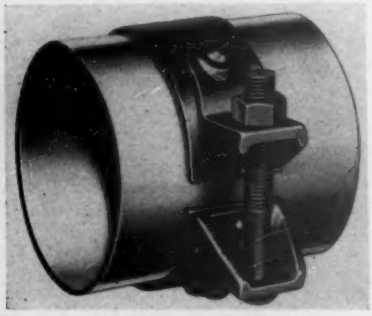
H. Carl Wolf, Chairman of the Committee on National Advertising, has announced the appointment of W. M. Jacobs, general superintendent of sales, Southern California Gas Company, Los Angeles, as Chairman of the Sub-Committee on Approval of Domestic Gas Copy. Chairman Wolf also has appointed Mr. Quinn to the same Committee.

New Equipment

New Band Clamp

Stating that conservation of existing pipe-lines and piping constitutes a challenge to manufacturers and suppliers as well as a major problem to operators and maintenance men, the Dresser Manufacturing Co. of Bradford, Pa., announces an addition to its regular line of repair devices—Style 77A Band Clamp, for the quick repair of small pin holes, leaks, and splits in straight runs of pipe.

Simple in construction, easy and fast to apply, it prevents further damage and loss of line contents where small defects in the line occur.



77A Dresser Clamp.

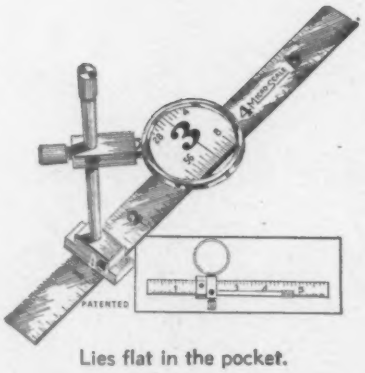
It is made up of a heavy, one-piece steel band of circular, split construction, with a riveted bolt lug at each end. A track-head bolt pulls the ends securely. To install, the clamp is sprung apart until it can be slipped around the pipe and over the gasket or packing; then it is bolted up to make a firm, leak-proof repair. A special cone gasket (furnished when specified) has two molded rubber tabs which aid in positioning the gasket over the pin hole or leak.

An unusual range of sizes is offered. This includes all standard pipe sizes from 1" I.D. to 26" O.D. Also cast-iron pipe and special sizes. Band widths of 2", 3", 4", and 6" may be had. Band thicknesses are 1/16", 3/32", and ⅛".

Micro Scale

The "Micro Scale" is manufactured by the Leonard Engineering Company, Capitol View, Maryland, and distributed by the L. V. Fox Company, Inc., Woodward Bldg., Washington, D. C.

With this scale the tool maker can easily see such fine divisions as a 64th about four times its normal size. This permits him to work to a few-thousandths easily, since



Lies flat in the pocket.

he can now split a 64th with his scriber.

It is so constructed that it lies quite flat on the surface block, has a patented, unbreakable plastic lens, which focuses and slides along the scale, and can be carried flat in the pocket. This scale should find a place in the tool box alongside the micrometer.

New Paving Breaker

Ingersoll-Rand Company announces a new 60 pound class "cushioned-air" paving breaker known as the CC-60. This tool is ideal for hard clay, shale, brick, concrete, or for jobs where it is not feasible to use a heavier tool. It is reported that this paving breaker is also very popular in many industrial plants where it is used for maintenance and "hard-to-get-at" jobs such as wall openings and foundation work. The ease in handling this tool comes from an air cushion which absorbs the blow of the piston when the steel is not in contact with the work. Consequently, there is far less fatigue for the operator and less breakage of parts. Although developed as a light-weight easy-handling tool, its hard hitting blow makes a fine machine for all-around paving breaker work.

Net weight, 63 lbs., Length Overall, 27 inches, Size of Inlet, ¾ inch, Size of Hose, ¾ inch, Size of Steel, 1⅛ inches.

A new booklet, Form 2768, gives more details. Address Ingersoll-Rand Company, 11 Broadway, New York.

Incendiary Bomb Extinguisher

In conformance with the Emergency Requirements of the United States Government, the American-LaFrance-Foamite Corporation, Elmira, N. Y., have designed a new pump tank with the amount of critical materials in its manufacture reduced to a minimum.

Pump Tank Extinguisher.

This new pump tank produces a straight stream and not a spray. This is in compliance with the latest requirement of the Office of Civilian Defense for controlling magnesium type incendiaries.

The new pump tank is made in 5 gal. and 2½ gal. sizes. It has an over-sized air chamber assuring minimum pulsation, a steady pressure and a more constant stream. It has a range of 30 to 40 feet. It is a self-contained unit and can be readily transported up ladders, over roofs and to points difficult of access.

It is equipped with a standard 26" hose and its interior has a cor-

and Appliances

rosion-resisting coating. The outside finish is of red enamel also designed to repel corrosion and to make its identity immediate.

Both sizes are approved by the Underwriters' Laboratories with a Class A-1 rating, under the Emergency Alternate Specifications.

Lodi Steam Generator

A simple, compact, efficient steam generator is announced by Super Mold Corporation of Lodi, California.

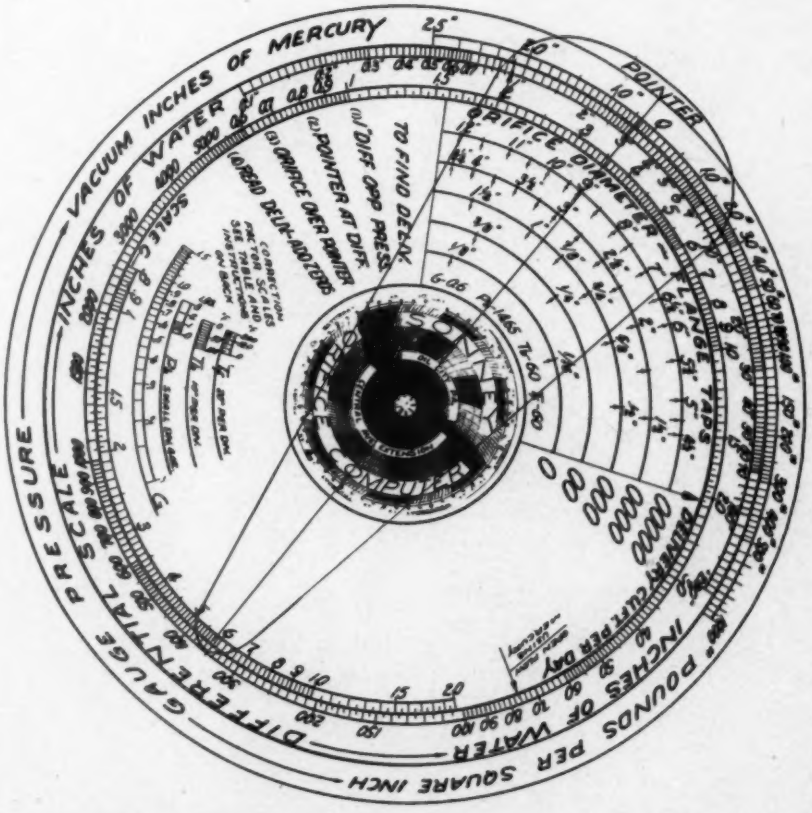
A new principle of water feeding, incorporating Jet Control, automatically and without the use of thermostats or motor driven pumps, furnishes feed water in direct proportion to the amount drawn off as steam.

Lodi Steam Generator.

The 10 h.p. model will develop 150 pounds pressure from a cold start in less than five minutes. Other models up to 70 h.p. are available. Shipped complete, ready to operate.

Burners are provided for either gas or oil fuel. No pit is required, and no fire boxes or electrical connections need be installed.

For Bulletin 222A write to Super Mold Corporation, 456 N. Sacramento Street, Lodi, Calif.



New Orifice Computer

A new device has been introduced to the industry to facilitate computations wherever gas is measured by orifice meter by The Sonney Orifice Computer, Oil City, Penna.

This computer is made in two designs and three sizes, of transparent discs on white opaque back and is exceptionally useful for quick determination of:

1. Rate of delivery of gas through an orifice meter,
2. Size of orifice to install in a meter,
3. Differential to maintain to deliver a desired rate of gas,
4. Pressure to maintain to deliver a desired rate of gas, and
5. Open flow of a well when using the orifice open flow tester.

No coefficient for the orifice is necessary in order to use this instrument but if the coefficient or gas characteristics are known, all corrections are provided on the Utility and Desk size computers to permit accurate computation.

The Pocket size instrument is 2¾ by 4½ inches rectangular shape and is designed primarily for orifice meter inspectors and field men. The Utility and Desk sizes are circular shape, 4¾" and 7½" diameter respectively, and are adaptable to office, shop, compressing station and refinery use.

Range of deliveries, pressures, differential and sizes of orifice cover practically all conditions met in ordinary practice.

These instruments, with simple but complete instructions, are available through this publication at $1.00 for the Pocket size, $2.00 for Utility size and $5.00 for Desk size.

Gas Welding Aluminum

Park Stewart, 1004 Carbis St., Worthington, Pa., announces a new flux for the gas welding of magnesium. This new flux is suitable for gas welding all alloys of magnesium whether sheet or extrusions.

It may be mixed to a thin paste by slowly pouring flux into water while stirring.

For best results it is suggested that the user paint the metal to be welded, with the flux, using a small brush. It is also advisable to coat the welding wire by dipping it into a tube of Mag-Na-Flo Flux.

Book Reviews

Substitutes by H. Bennett. Chemical Publishing Co., Inc., 234 King Street, Brooklyn, N. Y. 1943. 225 pages. Price $4.00.

This is a handbook of substitutes and alternatives for chemicals, metals, fibres and other commercial products including a plan for choosing proper substitutes.

The first 51 pages are devoted to theory. No two substances have exactly the same properties. Therefore a substitute ordinarily will not behave exactly as the original material. The author here considers in detail the various properties which should be investigated in selecting a substitute.

The rest of the book contains a detailed list of materials and compounds and the substitutes for them which are likely to be satisfactory. A few of the materials considered are: Acids, acetone, alcohols, alloys, aluminum, amines, aniline, asbestos, burlap, carbon tetrachloride, chlorine, cobalt, copper, cork, formaldehyde, gelatin, glue, glycerin, glycols, gums, latex, leather, magnesium, mahogany, manganese, mercury, mica, naphthalene, neatsfoot oil, nickel, nitrocellulose, phenol, plastics, platinum, resins (natural and synthetic), rubber and shellac, silk, solvents, sugar, sulfated fatty alcohols, sulfonated oils, tin, toluol, tung oil, tungsten, vanadium, wetting agents, wool zinc and many other raw materials, intermediates and finished products.

The New Commercial Technical Dictionary—English-Spanish, by Antonio Perol Guerrero. 1942. Editorial Técnica Unida, Brooklyn, N. Y. (The Chemical Publishing Co., Inc., 234 King Street, Brooklyn, N. Y.) 600 pages. Price $10.00.

This dictionary contains more than 50,000 words used in electrical, mechanical, chemical and marine engineering, radio, mining, textile and other industries as well as modern words referring to mechanical and motorized warfare, aviation, meteorology, etc. Also included are words used in business and commerce, conversion tables of weights and measures, English and Metric Systems.

The author has attempted to set a standard of terminology for all technical and commercial words.

"Procedure Handbook of Arc Welding Design and Practice," seventh edition, published by The Lincoln Electric Company, Cleveland, Ohio; 1,308 pages, 6 x 9 inches, 1,810 illustrations, including photos and drawings; cover, semi-flexible simulated leather, gold embossed; price postpaid United States $1.50 per copy, elsewhere $2.00 per copy.

Greatly enlarged, the seventh edition of the Procedure Handbook has just been published.

Authors of the book have made every effort to provide as much complete and up-to-date information as possible to help the men in the shops, shipyards, airplane factories, ordnance plants and arsenals produce to the fullest extent.

The book explains more fully than ever before the various methods and techniques used in welding, with a view to speeding up welding design and engineering and to make it easier for the thousands of men in training to learn the essentials of welding in the shortest possible time.

Illustrated more exhaustively and more clearly than ever before is the chapter on "Typical Applications of Arc Welding." Large numbers of these new applications have been developed during the past year in the many fields of war production.

New and significant information is given in the new Handbook on such subjects as welding symbols, new allowable stresses, pre-heating for welding, stress relieving, procedures, speeds and costs, "Fleet-Fillet" technique, general metallurgical characteristics of metals and alloys, weldability of aluminum alloys, tubular construction, appearance and styling of welded design and many others.

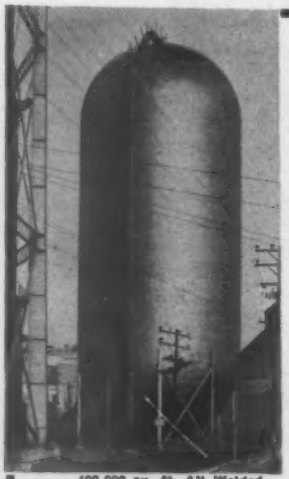
The National Paint Dictionary, Second Edition, by Jeffrey R. Stewart, Editor and Publisher of the National Paint Bulletin. Published by the Stewart Research Laboratory, 1340 New York Avenue N.W., Washington, D. C. July, 1942. 224 pages, 9" x 12" with approximately 200 illustrations and charts. Price $7.50.

This book is actually a handbook as well as a dictionary having to do with the subject of paint.

The first 142 pages comprise the dictionary. This includes words associated with the paint industry and their definitions. Trade names of raw materials, with their definitions, are given, but no attempt has been made to list the trade names of finished products.

The latter part of the book contains valuable handbook material in a form quite similar to the American Gas Handbook, but of course pertaining to the paint rather than the gas industry.

To those who have frequent need for technical information on paint, this book should be very valuable.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News of the Gas Industry

Shortage of Natural Gas Hits Upstate Industry

An acute shortage of natural gas has curtailed supplies for war industries in thirty-four western and central New York communities, the War Production Board reports, asking voluntary cooperation of householders in the next six weeks to alleviate the condition.

The situation was outlined at a meeting of gas company executives, government officials and representatives of the Army and Navy.

Martin T. Bennett, chief of the gas production section of the W. P. B. power division in Washington, warned that the W. P. B. will exercise its power of shutting off gas mains unless the public cooperates sufficiently.

C. L. Brockschmidt, chief of the W. P. B. gas allocations unit, called use of natural gas by householders for space heating "next to criminal in the face of this serious shortage."

The following communities were said by the W. P. B. to be involved in the shortage: Auburn, Geneva, Buffalo, Canandaigua, East Aurora, Hamburg, Syracuse, Lancaster, Batavia, Le Roy, Jamestown, Fredonia, Dunkirk, Farnham, Olean, Salamanca, Wellesville, Perry, Dansville, Geneseo, Binghamton, Newark, Elmira, Walton, Corning, Ithaca, Cortland, Port Jervis, Owego, Seneca Falls, Ellicott, Haverstraw, Clarkstown and Middletown.

Federal Power Commission Denies Cabot Petitions

The Federal Power Commission announced January 12 an order and opinion (No. 86) denying to the Cabot Gas Corporation and Godfrey L. Cabot, Inc., permission to abandon pipeline facilities in upper New York State. The opinion states that "should these applications be granted certain industries, of which several are engaged in war production, numerous towns and villages, including at least several hundred homes and a number of schools and buildings now heated by gas, might and probably would be, on short notice, deprived of essential services which the applicants have undertaken to render and for which the public has properly relied upon the Cabot companies. In such a case, at the beginning of winter and with war-time scarcities and limitations obtaining, it is proper that the applicants be held to convincing proof of the specific conditions of Section 7(b) of the Natural Gas Act, namely, that their available supply of natural gas 'is depleted to the extent that continuance of service is unwarranted,' and that 'present or future public convenience or necessity permit such abandonment.'"

Cabot Gas Corporation sought permission in Docket G-406 to abandon the service of natural gas from its 14-inch pipeline to its customers in the State of New York, and to abandon the transportation of natural gas for ultimate redelivery to Godfrey L. Cabot, Inc., parent company of Cabot Gas Corporation. By its separate application in Docket G-407, Godfrey L. Cabot, Inc., applied for permission to cease supplying natural gas to Cabot Gas Corporation, to Producers Gas Company at points in Angelica and Belmont, Allegany County, New York, and to certain customers of Empire Gas and Fuel Company also in Allegany County.

Servel Praised for War Effort at Army-Navy Award Ceremony

High praise for the management and workers of Servel, Inc., in the manufacture of war equipment was voiced by prominent army and navy officers participating in the Army-Navy "E" Production Award which was officially presented to the Servel organization at Evansville, Indiana, on January 15.

The ceremonies were held in the company's huge new war production building and witnessed by a capacity audience of more than 10,000 persons, including employees, speakers and special guests. Dedication of the new building, which adds 235,000 square feet of floor space to the Servel plant, took place at the same time.

Presentation of the Army-Navy "E" pennant for excellence in the production of war equipment was made by Col. Fred A. McMahon, chief of the Cincinnati Ordnance District, Cincinnati, Ohio.

In accepting the award, Louis Ruthenburg, president of Servel, Inc., said he spoke for the men and women who work at the machines and benches, supervision, management, and directors who were impressed anew with a deep sense of responsibility in the war program.

"The wartime policy of American industry is to contribute its utmost toward winning the war as quickly as possible," he declared. "Servel wholeheartedly subscribes to, and is motivated by, that policy."

Lieut. Commander F. G. Healy of the United States Navy awarded the lapel pins to Servel workers. Acceptance of these pins on behalf of the workers was made by August Horstman, president of the Servel Employees Association.

Dedication of Servel's new war production building was in charge of Major F. A. Dixon, United States Army Air Forces, who also congratulated the employees on this rapid changeover from peace time to war production.

Master of ceremonies for the event was Chester C. Davis, president of the Eighth District Federal Reserve Bank, St. Louis, Mo., who in turn was introduced by Geo. S. Jones, Jr., vice president and general sales manager of Servel, Inc.

Among the representatives of the gas industry at the ceremonies were: B. T. Franck, vice president, Milwaukee Gas Light Co.; Miss Jessie McQueen, home service counselor, American Gas Association, and Hugh H. Cuthrell, vice president, Brooklyn Union Gas Co.

Geo. S. Jones, Jr., vice president and general sales manager of Servel, Inc., and chairman of Servel's Army-Navy Production Award ceremonies on January 15, displays the company's new pennant for excellence in war production. The award was accepted for the men and women of Servel by Louis Ruthenburg, president.

Convertible Water Heater Unit Meets Fuel Emergency

At the plant of the Modern Laundry in Cedar Rapids, Iowa, a quick changeover from gas to oil fuel in a Lattner gas-oil burner successfully met an emergency due to gas shortage.

On January 13th there was a break in the main gas line south of Cedar Rapids. In order to conserve gas for the domestic heating load it was necessary for all industrials using gas to either shut down or convert their steam plants to other fuel. The emergency was acute and no delay was permitted.

One of the 35 H.P. combination gas-oil boilers was in operation at the Modern Laundry Company in Cedar Rapids operating on 150 Btu. natural gas. The oil lines to the burner for standby purposes had been previously installed and the standby tank was full of fuel oil. Within thirty minutes the gas line had been removed from the burner, the gas manifold removed from the burner, the oil manifold installed, the oil lines connected and the boiler was carrying steam under oil firing.

The prime purpose for the development of this new burner was to permit changeover from one fuel to another to obtain the benefit of seasonable rates on gas. The emergency factor had only been considered as a secondary feature. The Modern Laundry now recognizes it as the primary feature.

From Kitchen Ranges to Lifeboats Globe American Produces 20 All-Steel Lifeboats Per Day

The factory that formerly produced the Dutch Oven Kitchen Range presents a strange sight in these war days. Outwardly unchanged, with the exception of a new flag pole that flies the Maritime Commission "M" pennant, the inside of the plant where once gas and electric ranges were built is now filled with row upon row of big all-steel lifeboats in the process of construction.

The interesting feature of this operation is in the application of mass production methods to lifeboat manufacture. A 650 foot motorized assembly line moving at 32 feet per hour holds 39 lifeboats in the process of assembly at any one time. Every 48 minutes one of these boats, 22 feet long, weighing a ton and a half with capacity for 31 persons, moves off the line onto the shipping platform. Every other boat is equipped with a motor, and can be used to tow the boats not so equipped.

The remarkable production schedule achieved by Globe American, is of a pattern with the amazing performance of the entire ship building industry. "When we first started building these boats in December of last year," says Mr. Alden P. Chester, Vice President and General Manager, "we were fortunate if we turned out 2 a day. That is nothing to be wondered at, when you consider that most of our men, living here in Kokomo, Indiana, a thousand miles from the sea had never seen a lifeboat. Today we are turning out one every 48 minutes and 20 completely equipped boats every day."

The equipment in these lifeboats is extremely interesting and has undergone something of an evolution in the past year as pointed out by Mr. Chester. "Where we first equipped these boats with only 1 quart of water for each person, we now have 11 quarts per person," he said. "The experiences of the crews who have lived for many days in these lifeboats after the ships had been sunk dictated this change. The emergency rations have been changed, also. Where once lifeboats were equipped with hard tack and condensed milk, they now have scientifically prepared dehydrated foods of known caloric and vitamin content. Such emergency rations take up the least amount of space with the maximum of food and life sustaining value." All boats are shipped complete with all the latest equipment required for emergency use by all occupants including mast and sails, signal flags, oars, compass, first aid equipment, and innumerable other supplies all stowed in watertight compartments or lashed in place to prevent their loss in event the boat is capsized.

The lifeboat built by Globe American was originally designed by their engineers and was accepted as standard by the Maritime Commission. It embodied several innovations in lifeboat construction such as new simultaneous release mechanism and grab rails on the bottom for use in righting in the event the boat is overturned. The entire construction is unique, in that it is practically all-steel and non-sinkable.

Bryant Heater Co. Receives Army-Navy E Award

The Bryant Heater Co., Cleveland, O., received the Army-Navy E award January 9th.

Col. H. M. Reedall, Cleveland Ordnance District chief, pointed out to the workers that they had a big job on their hands making assembly parts for tanks and tank destroyers—they and the employees of 98 other small companies doing the same job.

In accepting the award from Col. Reedall, President Lyle C. Harvey stated that he was accepting it not only for the workers of his plant but also for those of the 98 other comrade companies.

Commander W. C. Bacon, senior assistant naval material inspector for Cleveland, made the presentation of the "E" pins to Dan Jack, senior employee who

Lyle C. Harvey

was selected by the employees to represent them.

Before and after the award program many of the employees inspected and rode in the 30-ton General Lee tank brought there for the occasion.

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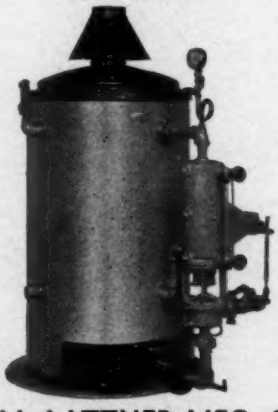

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Years

Norton McKean Elected President American Meter Co.

At a recent meeting of the Board of Directors of American Meter Company, Mr. Norton McKean was elected President to fill the vacancy caused by the recent death of Mr. Francis H. Payne. Mr. McKean was formerly Vice President, Treasurer and General Manager.

Elected Vice Presidents were John C. Diehl, formerly Chief Engineer, with Headquarters in Erie, Pa., and Arthur E. Norton, formerly Manager of the Company's factory in Boston. Mr. Diehl was also appointed to serve as Manager of the Metric Metal Works Plant in Erie, Pa. A. McW. Wolfe, the Assistant Manager in Boston, was promoted to the Managership of the Boston plant serving the New England area.

Mr. Calvin A. Nichols, Controller and Assistant Treasurer, has been made Acting Treasurer.

Arthur F. Benson, formerly Assistant Chief Engineer, was promoted to Chief Engineer of the Company.

Mr. McKean first joined American Meter Company in July, 1913 in Boston, Mass. He advanced to several positions of responsibiilty before he was made Manager of the Albany plant in January, 1928. He has been a Director since April, 1932, became General Manager in 1936, Vice President in 1937, and added the duties of Treasurer in 1938.

Mr. John C. Diehl first became associated with American Meter Company in 1919, serving as Engineer until 1929, when he was made Chief Engineer. He has been a Director since 1934.

Mr. Arthur E. Norton first came with the company in 1898 with the Nathaniel Tufts Meter Works in Boston. He was appointed Manager in December, 1927, and elected a Director of the Corporation in 1932.

Mr. Arthur E. Benson joined the Metric Metal Works factory in January, 1930, as an engineer.

Mr. Robert O. Borden, who has now been promoted to Assistant Manager, joined the engineering staff of the Company at Erie, Pa. in 1925.

Mr. A. McW. Wolfe entered the employ of the Company with the Maryland Meter Works in Baltimore immediately after the war in 1919. In 1934 he was transferred to the Boston plant as Assistant Manager of the New England territory.

Norton McKean

Mr. Calvin A. Nichols joined the Company in October, 1936 as Assistant to the Controller. He was appointed Controller in 1937, and in addition had been Assistant Treasurer since 1939.

Victory Book Campaign

The 1943 Victory Book Campaign, handled by the National Campaign Board, Empire State Bldg., New York, is making the following appeal for the donation of books for the men in the various war services.

They state: "We, as an organization, have pledged our support and active participation in the 1943 Victory Book Campaign. We need your help, your volunteer assistance and organizing capacity, both as an individual and as an organization member, to insure for ourselves a lion's share in the over-all contribution to the drive.

"The second edition of the Victory Book Campaign will open on January 5 and end on March 5, 1943. Industrial, civic, educational, labor and community organizations are contributing this year, more than ever, by cooperating in the collection of books for men in our armed services.

"The emphasis has been, and is today, on the very best books you can give. This means, first of all, the books must be in good physical condition, not the broken-down, dog-eared volumes accumulating dust and mould in the attic.

"When you rifle your bookshelves, pick out the books you especially value—and give them! See that your neighbor does the same thing. Choose books that are in good condition, fiction and non-fiction, that have given you wonderful hours of enjoyment, release and deep-felt happiness. Remember, books are the life-blood of the soldier's spirit.

"In this huge, cooperative undertaking we want to do our share and do it well. In addition to donating your own books, we need volunteers—volunteers to serve on collection committees, to paper each community with book deposit containers, to circulate posters, to chauffeur books from collection centers to the libraries, and to spread the message "ANY BOOK YOU REALLY WANT TO KEEP IS A GOOD ONE TO GIVE." Let us know of your willingness to work—and we'll put you to work."

Missouri Assn. of Public Utilities

The annual business meeting of the Missouri Association of Public Utilities is scheduled to be held at the Elms Hotel, Excelsior Springs, Mo., on April 16th and 17th.

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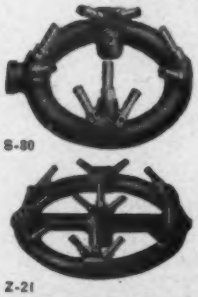

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R-S Products Corporation Elects Vice President

David W. Hopkins, secretary and director of the R-S Products Corporation, Philadelphia, Pa., for a number of years, has been elected vice president of that corporation. This announcement followed a recent meeting of the Board of Directors. He will continue in charge of the company's Valve Division.

Photograph by Bachrach

David W. Hopkins

Mr. Hopkins was graduated from the University of Pennsylvania as a Mechanical Engineer and later took post graduate work in aeronautical engineering at the Massachusetts Institute of Technology. He was a Navy flier in the last war.

Cooper-Bessemer Assigns Compressor Specialist to West Coast Branch

Philip W. Mettling, Cooper-Bessemer compressor expert, stationed at the corporation's Mount Vernon, Ohio, plant for the past several years, has been transferred to the firm's branch office at 640 East 61st Street, Los Angeles, California.

In announcing the change, Cooper-Bessemer officials reported that Mettling will continue his work as a compressor calculation engineer. His transferment will bring him in closer contact with the field in that important area, thus expediting the installation, operation, and servicing of Cooper-Bessemer compressors which are critically essential in certain major war industries.

Photo by R. W. Stafford

The Detroit Edison Co. members with whose cooperation the "Substitute Gasoline Enrichment Oil Experiments" were run at Port Huron, Jan. 4th, 1943. Top row from left, A. S. Fleiger and Marshal Hyde. Seated, from left, F. Limberg, M. Coughill, Gus A. Harmel and Wm. Huffmaster.

Canadian Notes

The Union Gas Company of Canada, Limited, has announced the resignation of S. A. Morse of Chatham, Ont., who has been president and general manager of the company for fifteen years, and the election of David P. Rogers of Toronto as his successor. Mr. Morse resigned because of continued ill health, but due to his long and valued experience in the industry, he was retained as a director and chairman of the board. Lieut.-Col. Thomas Weir, M.C., who was appointed general manager, has had a long experience with the company, particularly in Southwestern Ontario. He was granted leave of absence by the company at the end of 1939 to permit his entry into the army and of late he has been serving as an assistant adjutant-general. He has been released from the Canadian Active force.

The Ontario Hydro Electric Power Commission with head office at Toronto, Ont., has been asked by the municipalities of the province to consider the matter of using the after-the-war surplus of electric power to decompose water to produce hydrogen gas which could be used to augment the diminishing supply of natural gas. The matter will be brought up at the next electrical convention in February.

Members and guests of the Ontario Chapter of the American Society of Heating and Ventilating Engineers with headquarters here, were recently taken on a tour of inspection of the local plant of the Consumer's Gas Company. The tour conducted by Mr. W. Philpott, plant superintendent of the company, was a decided innovation from the ASHVE dinner meetings, and served as a prelude to his fine luncheon address on the "Manufacture of Gas." O. J. Strain of the Consumer's Gas Co., spoke on the "Distribution and Application of Gas."

CHEMICAL TABLES

A Handbook of selected subjects from the Handbook of Chemistry & Physics 1938 Edition.

Subjects covered include Mathematical Tables; Properties and Physical Constants of Organic and Inorganic Compounds; General Chemical Tables; Specific Gravity and Properties of Matter; Heat and Hygrometry; Electricity; Light; Quantities and Units. Also other miscellaneous subjects.

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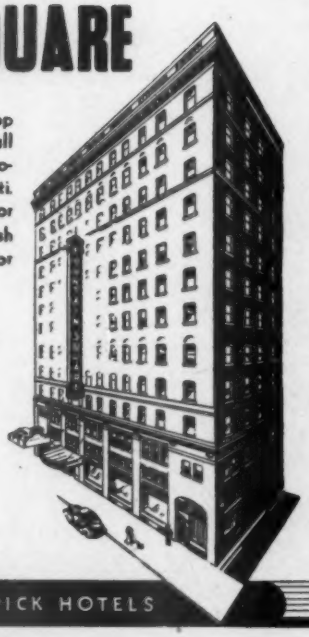

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WILLIAM PARKES KNOWLES

William Parkes Knowles, 91, veteran Richmond, Va., municipal government employee with 66 years' service with the city, died Dec. 24th, 1942.

At the time of his death, Mr. Knowles was superintendent of the City Gas Works.

Born in Richmond, August 17, 1851, Mr. Knowles started with the city utilities department as a gas inspector in 1876, and worked his way up to the superintendency. He was the oldest city employee, both in age and in point of service at the time of his death.

Despite his advanced age, Mr. Knowles was still active, going to his office every day, until about a month ago, when he became ill and was confined to his home by a physician.

EDWARD STEVENS

Mr. E. Stevens, of the Lattimer-Stevens Co., Columbus, O., died suddenly Jan. 10th from a heart attack. He was 41 years old.

For over 20 years he had been closely connected with the Lattimer-Stevens Company which was founded by his father, Mr. F. E. Stevens. He attended Ohio State University. At the time of his death he was Secretary of the Lattimer-Stevens Company. He was a member of the American Gas Association, Association of Gas Appliance and Equipment Manufacturers, Gild of Ancient Supplers, the National Association of Purchasing Agents and various other civic and business organizations.

opposite this point, a net figure to be compared with net figures similarly determined for other oils may be obtained.

Examination of Table No. 8 and Figure No. 2 shows that with gas oil at the prices shown in the first column of Table No. 8, the comparative permissible price payable for any other oil studied would be that appearing in the column identifying that oil. For other operating results, or other efficiencies of conversion of materials, or other unit prices than those applied in Table No. 7, the permissible prices for oils would, of course, be different from that in Table No. 8. Permissible price is taken to mean that price payable for a given oil which may be substituted without changing the total net cost of gas making materials.

Without allowing for fixed charges on, or additional operating expenses in connection with, special storage and handling facilities required for gasoline, it appears that, in situations where the assumed prices and efficiencies apply, gasoline can be used for carburetting water gas when it is available at a price of only a few mills above the price paid for other oils.

Conclusions:

1. Gasoline reacted satisfactorily as a carburetting medium in the water gas set used.

2. It appears that about 5 per cent more per gallon could be paid for gasoline than for gas oil—not allowing for special provisions to handle and store gasoline, nor deducting for the apparent inferior light oil produced.

3. Set capacity with gasoline approximately equalled that with other oils used in the plant when not reforming.

4. The increase of 14.5% in set capacity when reforming gasoline over that when not reforming would likely be equalled when reforming other oils in the plant.

5. Reforming could be justified only for sake of additional capacity except where generator fuel is priced high and/or gasoline is priced low.

6. Handling gasoline to and from 10,000 gallon temporary storage tanks with motor pumps and temporary piping presented no difficulties under the precautions followed.

7. Gasoline appears to be sensitive to a narrow carburetting temperature range to which the set must be closely held to avoid uncracked oil escaping with low temperatures and the formation of naphthalene and lampblack at high temperatures.

8. The B.t.u. contributed to the gas per gallon was 9 per cent more for gasoline nonreforming than for gas oil-Lima crude mixture.

9. Light oil production per MCF. was found to be approximately the same with gasoline as with gas oil; while the quality was found inferior.

10. Tar production per MCF. was found to be only 4 per cent of the quantity produced with gas oil.

11. Hydrogen sulphide was considerably lower in the gas made from gasoline than generally found in that made from other oils.

12. The Net Terzian Factor for gasoline was found to be close to that for gas oil and poorer than that for gas oil-Lima crude mixture.

13. In general, gasoline was found suitable for gas making and it appears that where it can be safely handled and stored, it would, at the proper price, be a suitable material for carburetting water gas.

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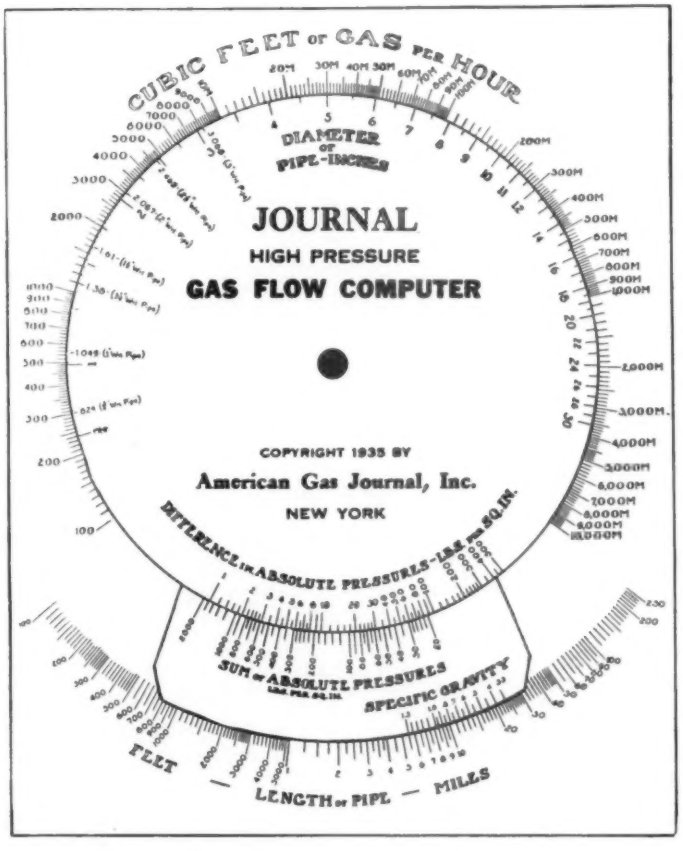

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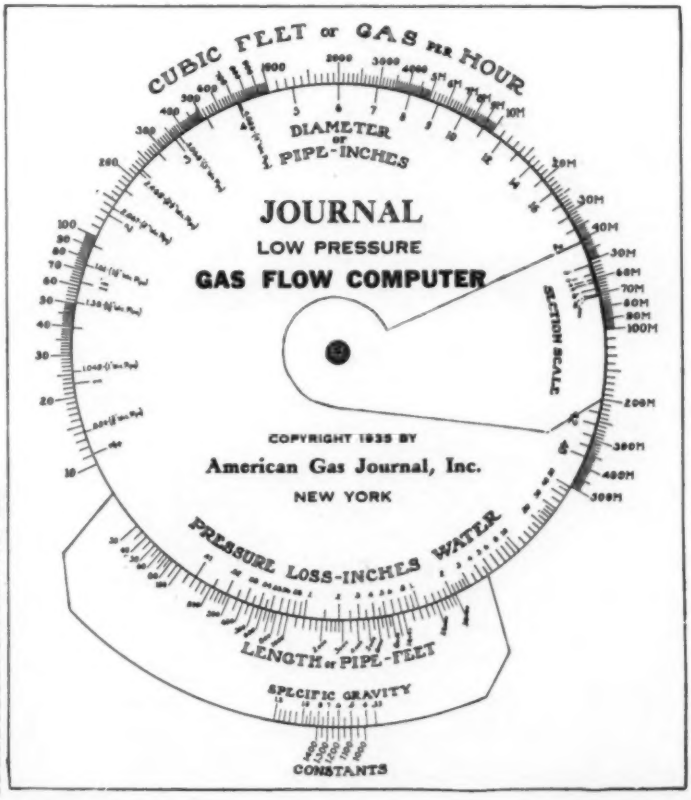

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